

ALASKA PENINSULA SALMON CATCH AND ESCAPEMENT SAMPLING
1989 OPERATIONAL PLANS

By

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FIELD MANUAL

1989 Salmon Catch Sampling
for the Alaska Peninsula

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INTRODUCTION

The Alaska Peninsula - Aleutian Islands commercial fishing area encompasses the Aleutian Islands, the North Alaska Peninsula west of Cape Menshikof, and the South Alaska Peninsula west of Kupreanof Point (Figures 1-9). There are approximately 444 salmon producing streams in the Aleutian Islands Area and 275 salmon producing streams in the Alaska Peninsula Area (ADF&G 1985).

Five salmon species are commercially harvested in the Alaska Peninsula - Aleutian Islands Area: chinook, sockeye, pink, chum, and coho. The average catch from 1978-1987 is 28,498 chinook, 3,747,391 sockeye, 6,414,392 pink, 1,884,585 chum, and 365,559 coho salmon. The fishing gear used is purse seine, drift gillnet, and set gillnet. During June of 1987 a total of 88 purse seiners, 155 drift gillnetters, and 97 set gillnetters fished west of the Ilnik Section. The Port Heiden and Cinder River sections and the Ilnik section after July compose an overlap area between the Alaska Peninsula - Aleutian Islands Area and Bristol Bay during May, June, August, and September. During 1987 approximately 51 Bristol Bay drift gillnetters and 10 set gillnetters fished the overlap area exclusive of the remainder of the Peninsula - Aleutians area (ADF&G 1986). No commercial salmon fishing effort presently occurs west of Unalaska Island.

Within the Alaska Peninsula - Aleutian Islands Management Area the majority of the catch is from local stocks. However, there are two notable interception fisheries and both occur on the South Peninsula. The first is in the South Unimak (Unimak District) and the Shumagin Islands Area where the June sockeye catch is predominantly fish migrating to Bristol Bay. The

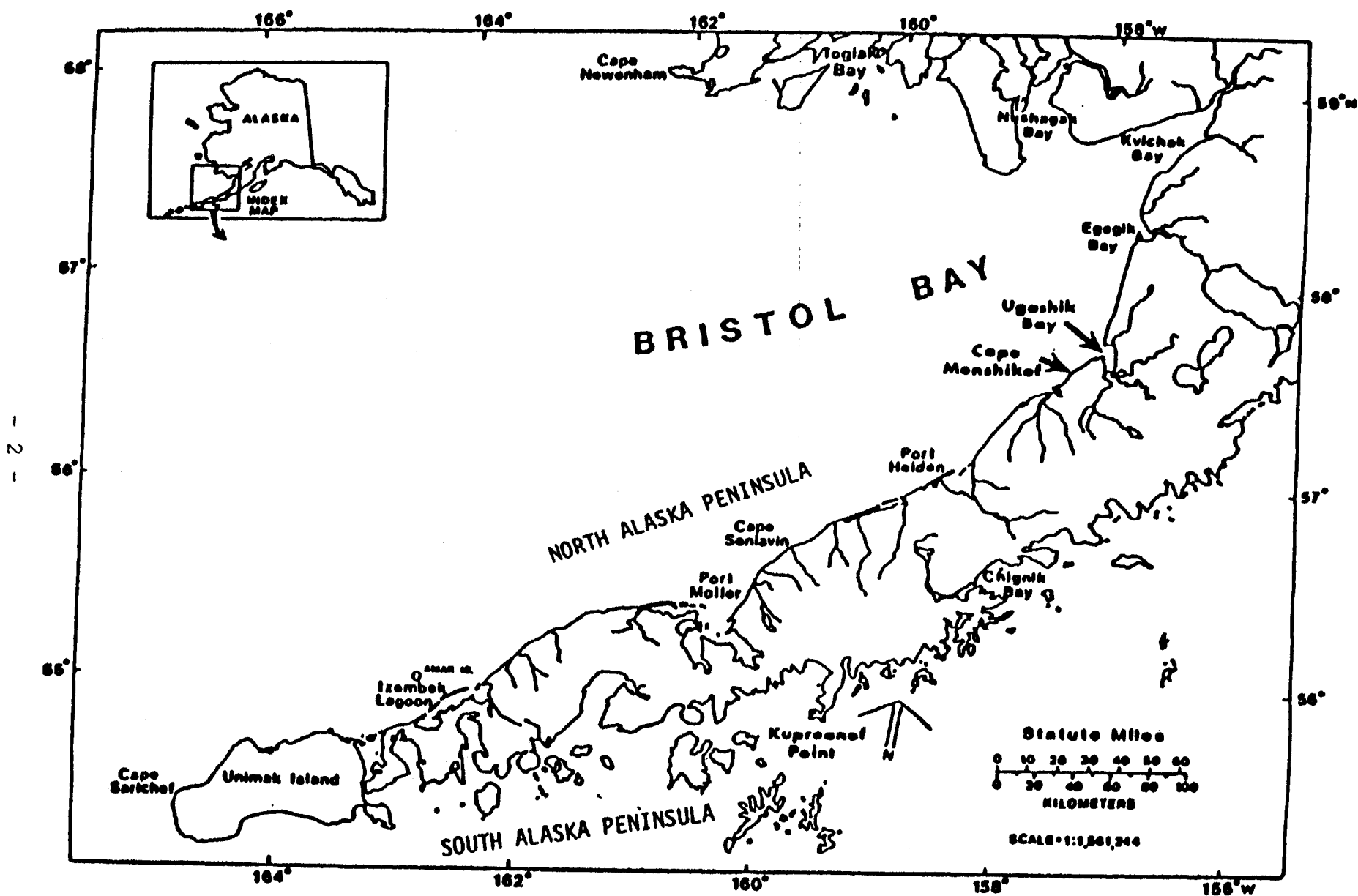


Figure 1. Map of the Alaska Peninsula from Kvichak Bay to Unimak Island.

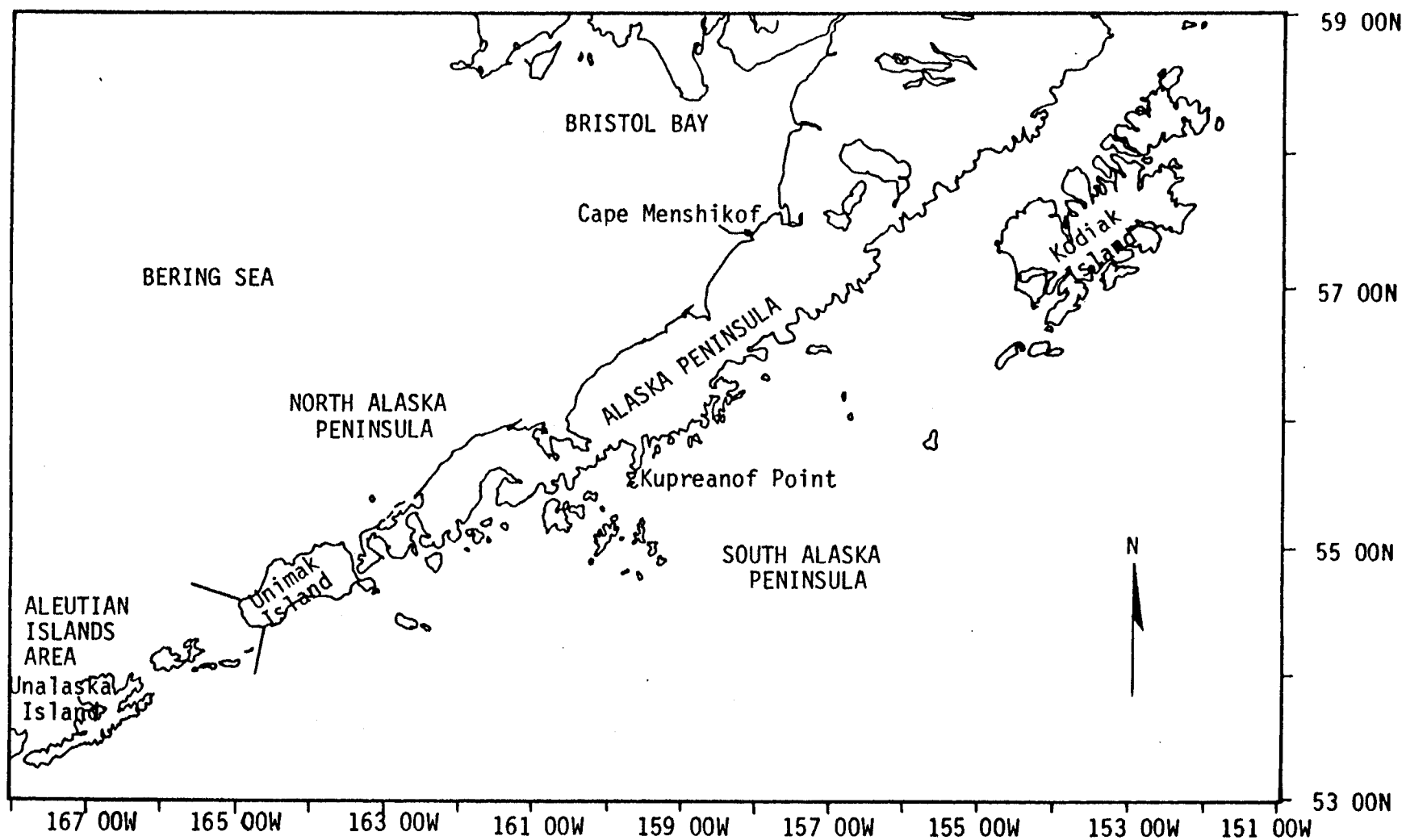
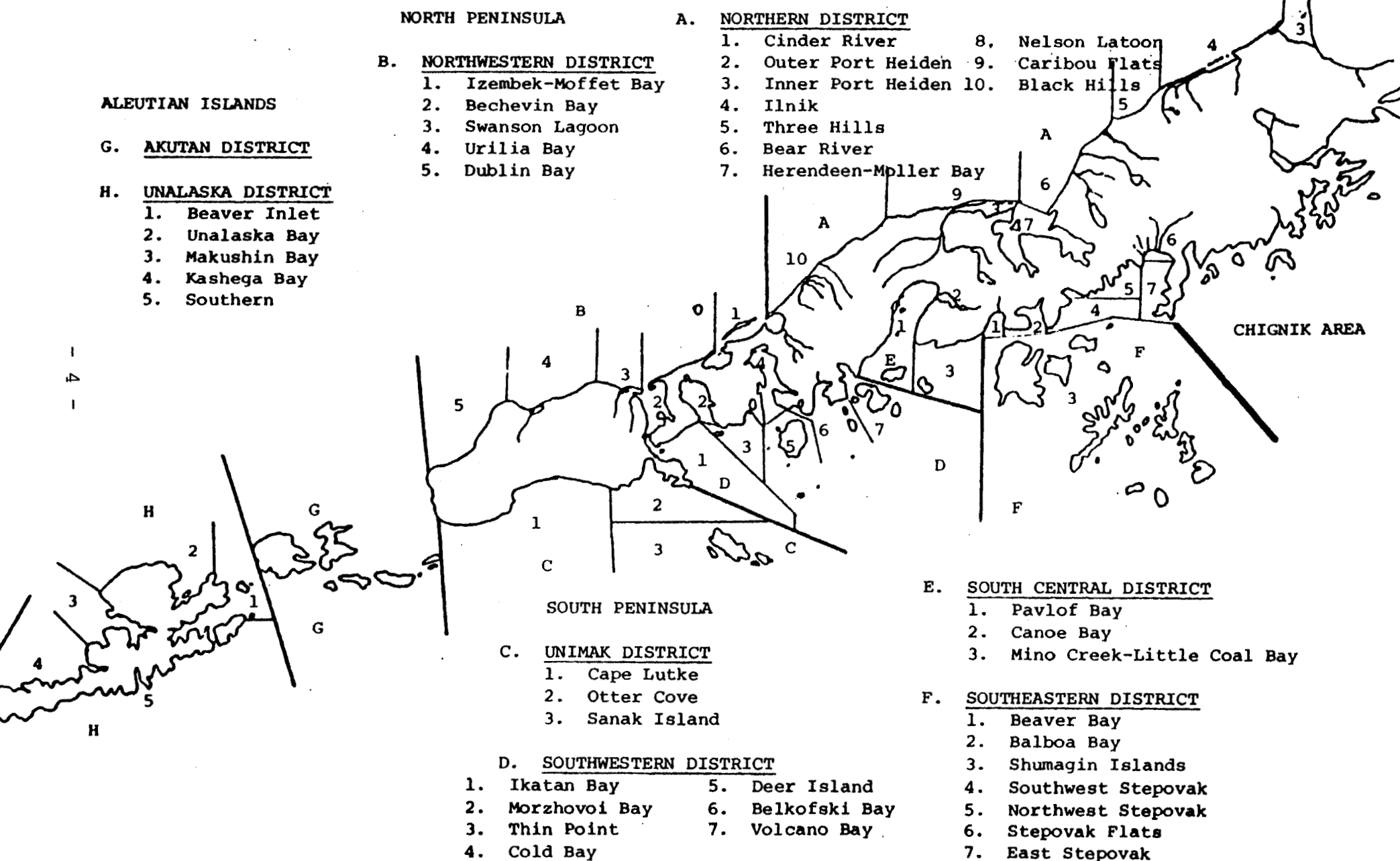


Figure 2. Map of the Alaska Peninsula-Aleutian Islands Management Area, the study area on the Pacific portion of the map is from Kupreanof Point to Unalaska Island and on the Bering Sea from Unalaska Island to Cape Menshikof.

SALMON

Figure 3. Alaska Peninsula-Aleutian Islands Management Areas Cape Menshikof to Unalaska Island. Districts (Letters A-H), Sections (Numbers)



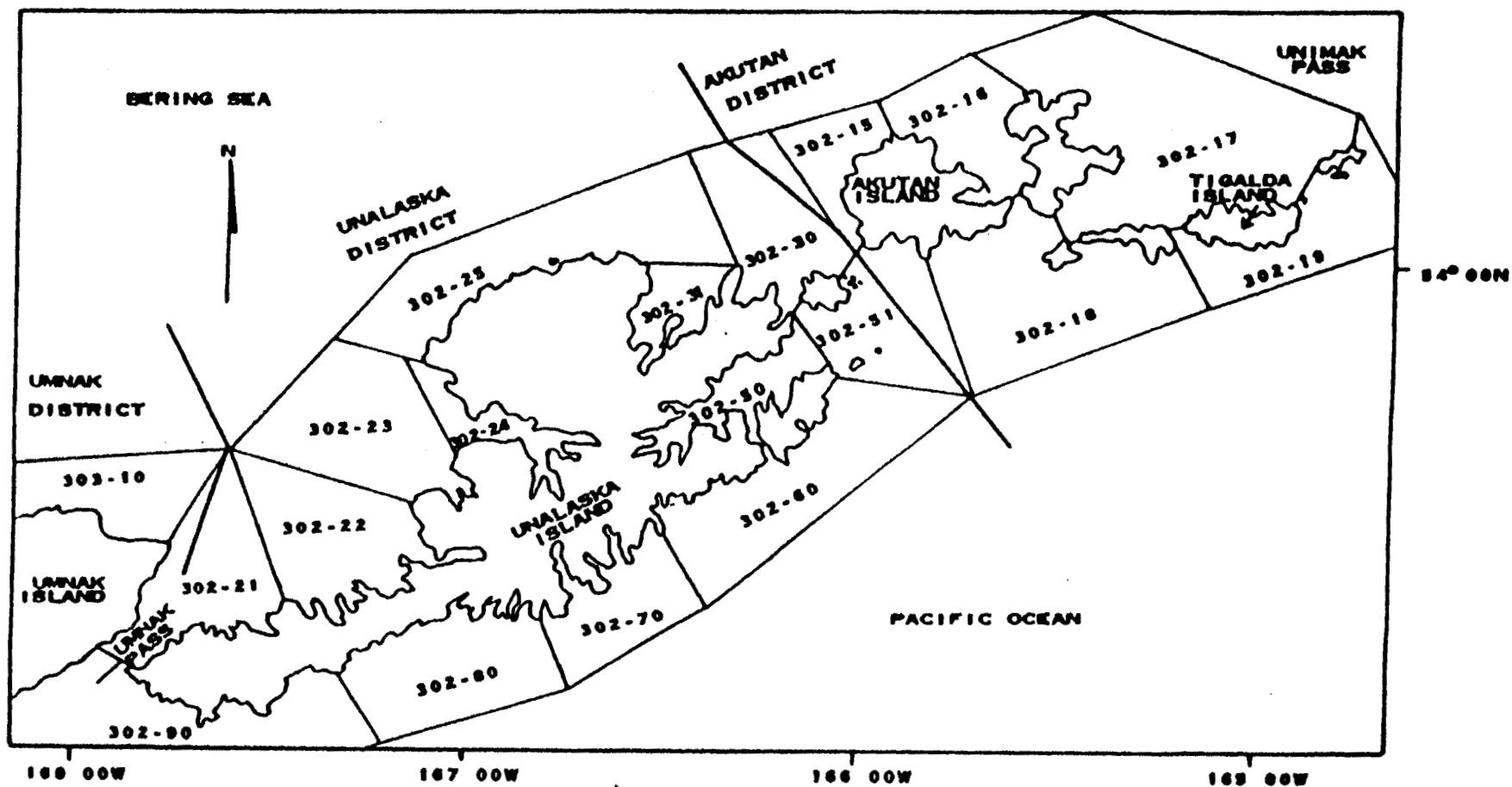


Figure 5. Map of the Aleutian Islands Management Area from Umnak Pass to Unimak Pass with the statistical salmon fishing areas defined.

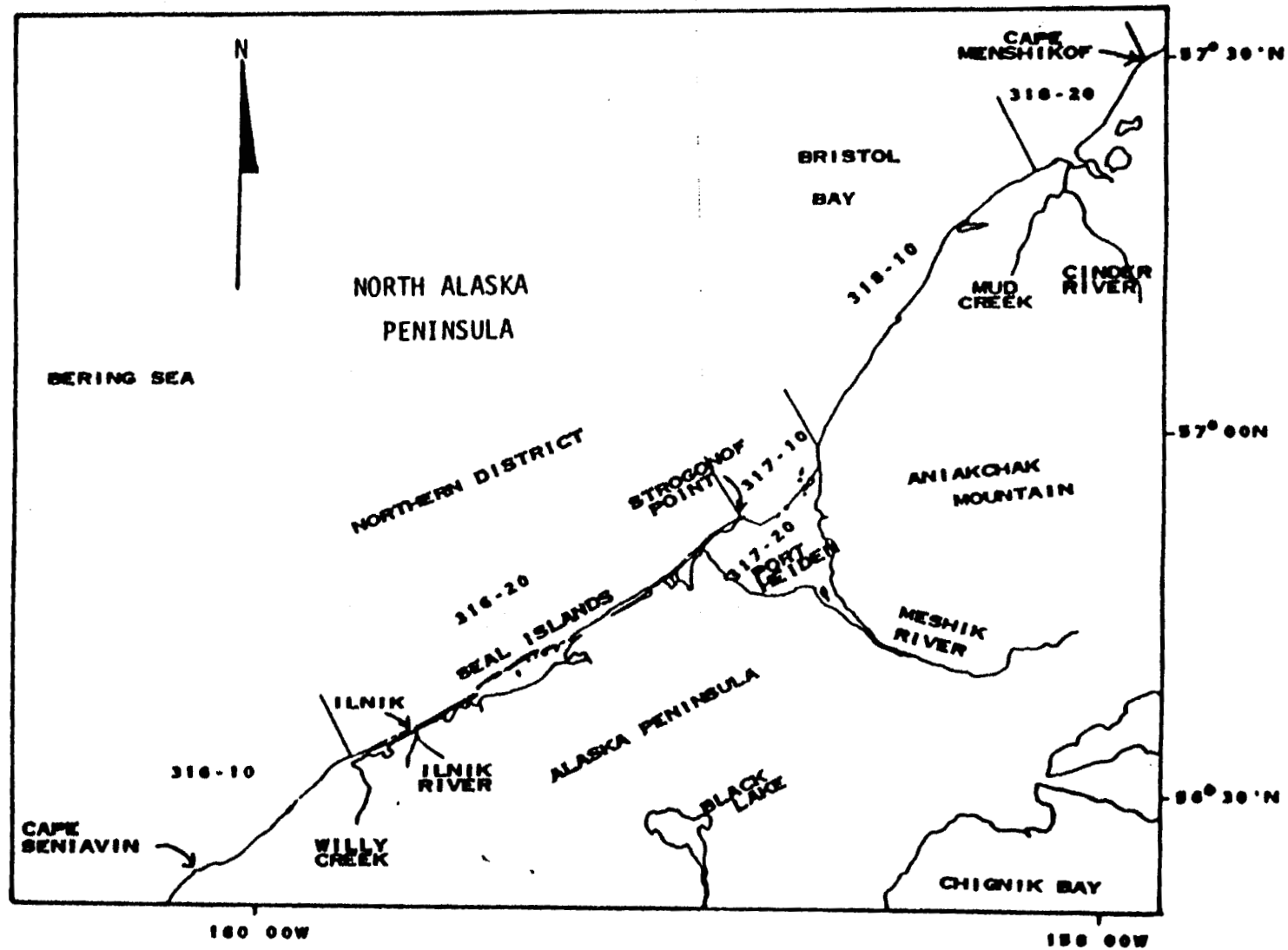


Figure 6. Map of the Alaska Peninsula Management Area from Cape Seniavin to Cape Menshikof with the statistical salmon fishing areas defined.

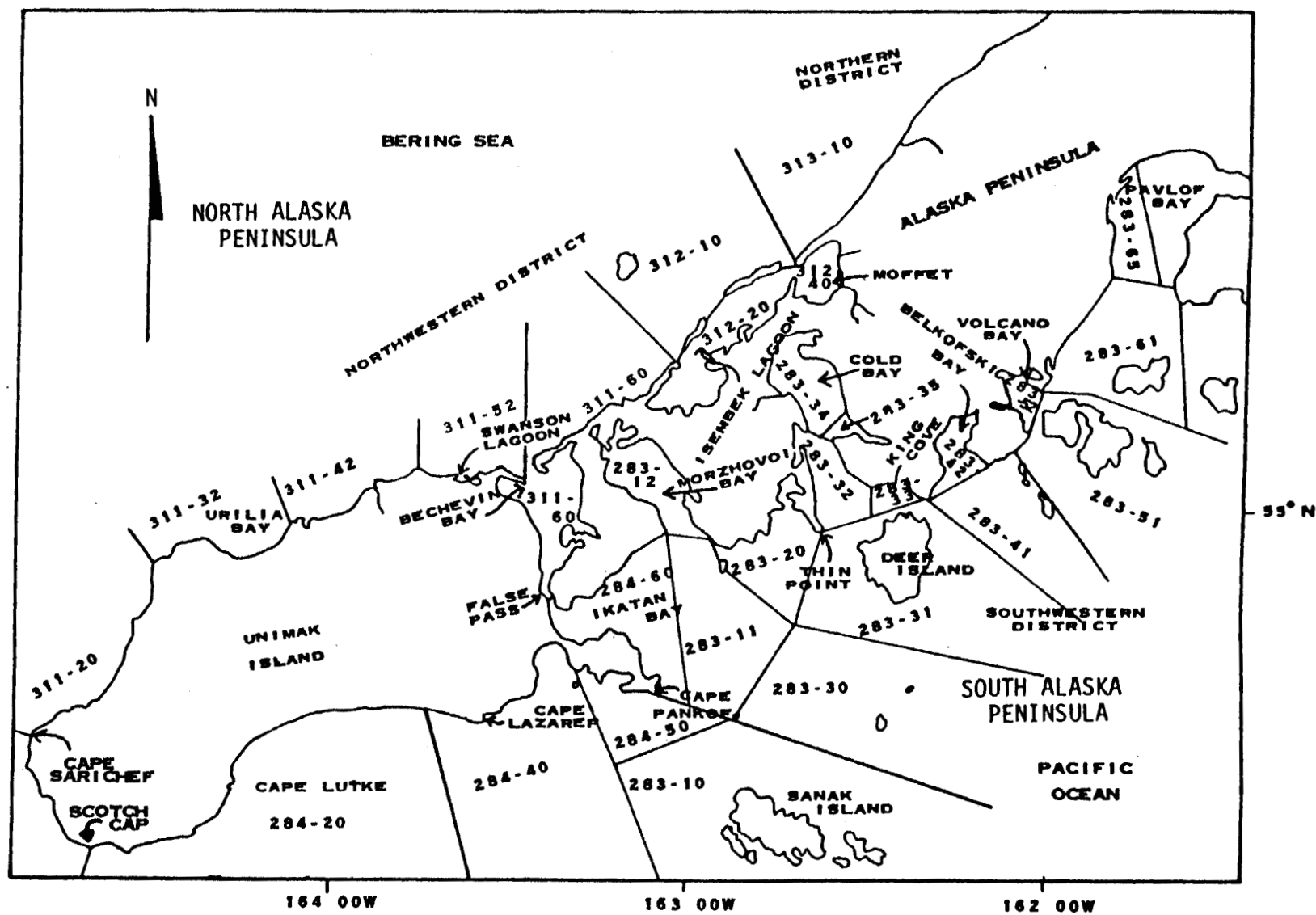


Figure 7. Map of the Alaska Peninsula Management Area from Cape Sarichef to Pavlof Bay with the statistical salmon fishing areas defined.

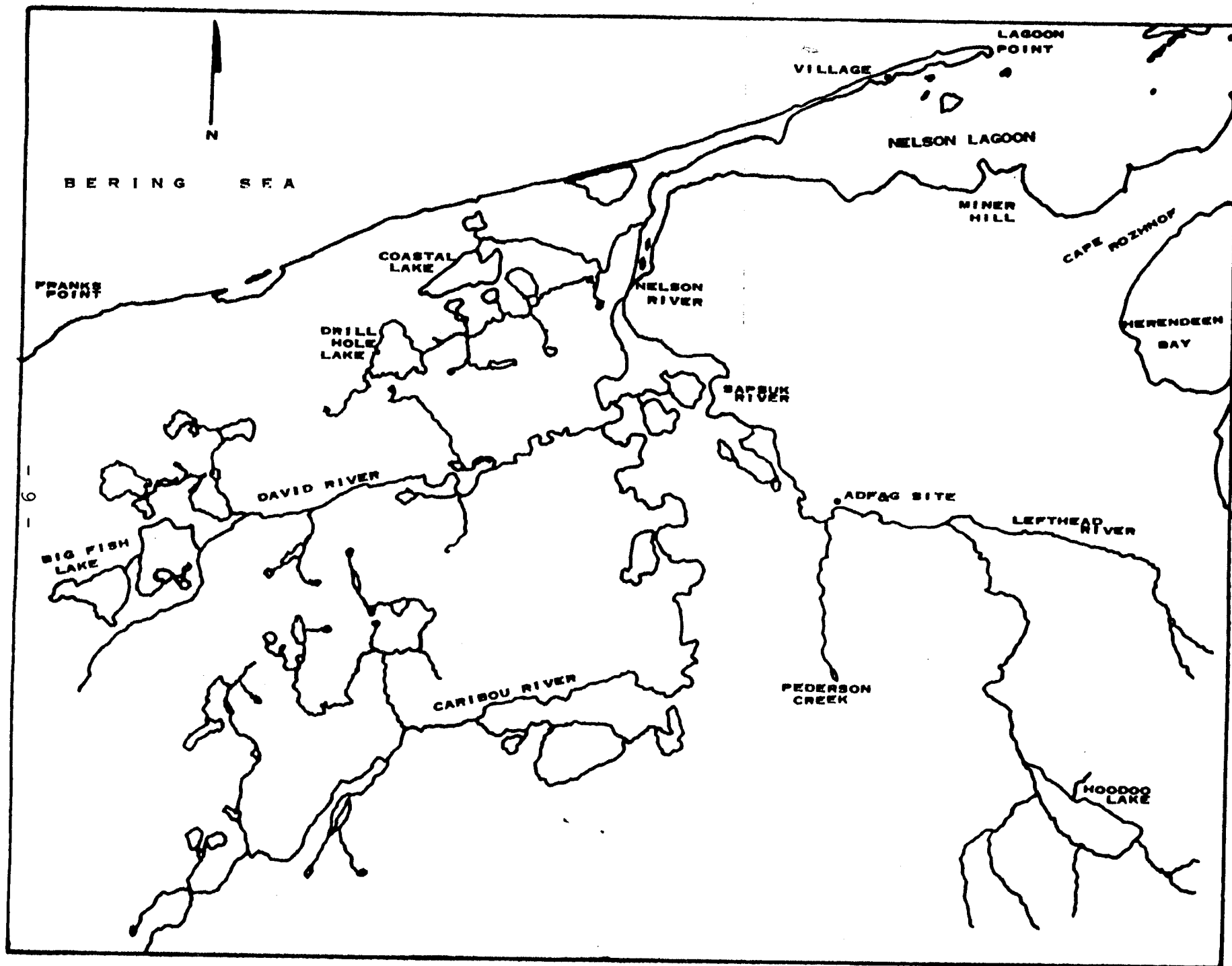


Figure 8. Map of the Nelson River drainage.

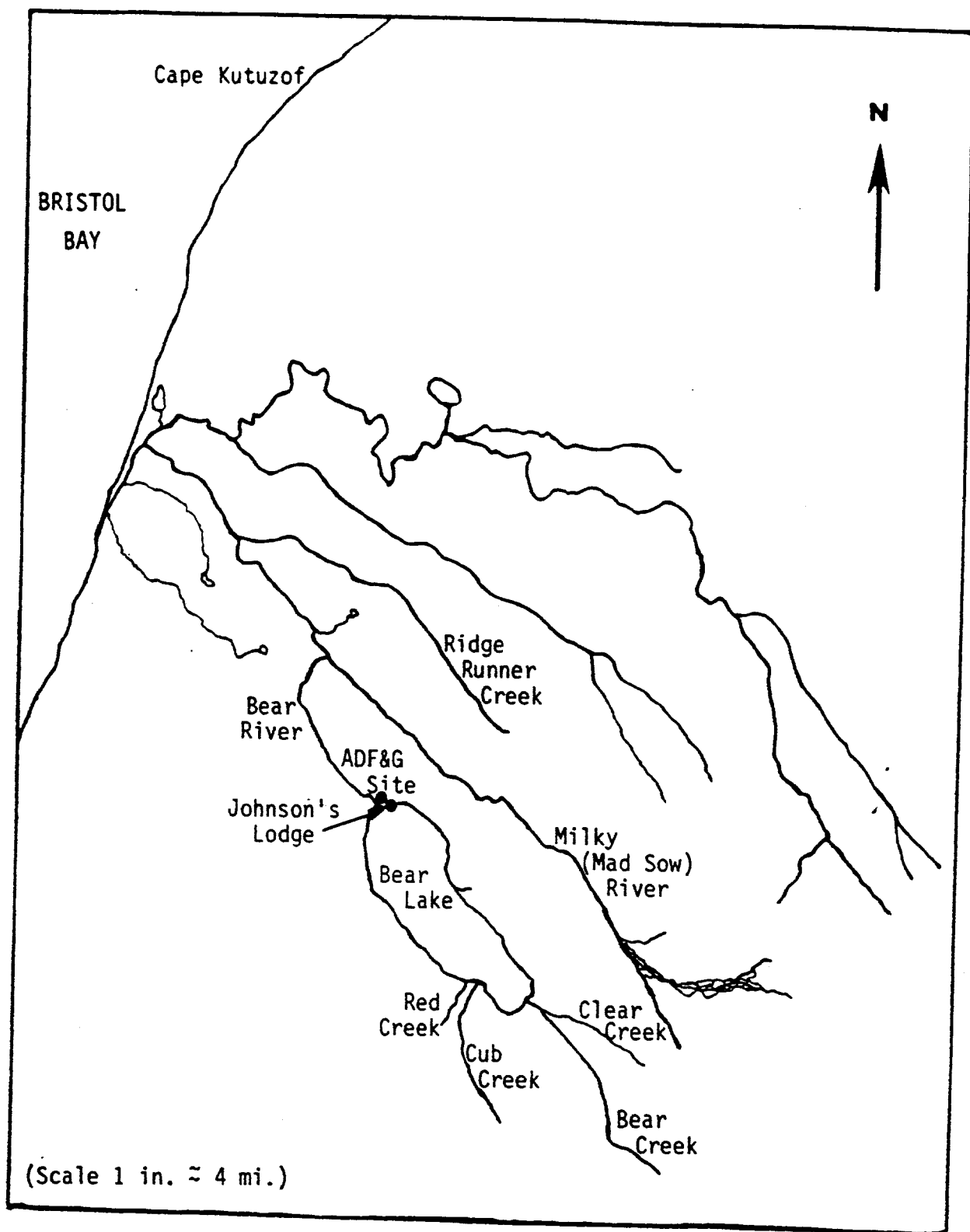


Figure 9. Map of the Bear Lake drainage.

second occurs in the Southeast Mainland area where the majority of the sockeye are migrating to the Chignik River system.

Economically, sockeye and pink salmon are usually the primary species in the South Alaska Peninsula while sockeye and chum salmon are the primary species in the North Alaska Peninsula and the Aleutian Islands. In 1988 all species catch for the entire area was 13,368,662 fish worth about \$84,592,000 to the fishermen (ADF&G 1989).

A basic function of fisheries management is to allow effort on stocks with harvestable surpluses while protecting those with returning runs below escapement requirements. Assignment of catch to river system of origin is a prerequisite to forecasting and evaluating escapement goals. In 1985 an expanded chinook, sockeye, chum, and coho salmon commercial catch sampling operation was initiated in the Alaska Peninsula Management Area for establishing a data base for separating stocks, evaluating escapement goals, forecasting, and assessing in-season run timing. The program has continued since. The current emphasis is on sockeye and chum salmon.

OBJECTIVES

Long Term: Better management of the salmon resources for the Alaska Peninsula - Aleutian Islands Area through improved forecasting, development of stock-recruitment relationships to assess escapement requirements, and accurate assessment of stock composition levels for mixed stock fisheries.

Short Term: Develop catch brood tables for the major sockeye and chum stocks and determine average sockeye catch length by age and sex for each major stock.

1. Determine salmon catch and effort by species and statistical area.
2. Determine the sockeye and chum age, length, and sex composition for the major terminal and interception fisheries within standard levels of precision.
3. Determine the chinook, sockeye, chum, and coho weight-length relationships for the major fisheries.
4. Establish an archive of scales suitable for analysis of stock separation in interception fisheries.

SUPERVISION

The Area Research Biologist (ARB), Jim McCullough, will supervise the catch sampling crews at Port Moller and King Cove. In this capacity the ARB will be in King Cove during June and in Port Moller from July to September to participate in and evaluate sampling operations. The ARB will monitor catch sampling operations conducted by the Area Management staff if they occur. The ARB will be in regular contact with the Area Management Biologist, Arnie Shaul, the Regional Finfish Research Biologist, Bruce Barrett, and the catch sampling crews.

PERSONNEL

The Alaska Peninsula - Aleutian Islands Area (Figure 1 - 4) has two major shore-based salmon processing plants where three person crews will be

stationed to sample the salmon catch, Port Moller (Figure 2) and King Cove (Figure 3).

Port Moller personnel will consist of the (ARB), a Fishery Biologist II, PCN 11-1407 held by Jim McCullough, a Fishery Technician III PCN 11-1433S held by Tracy McKinion, a Fishery Technician I, PCN 11-1611S held by Lief Brockman, and a Fishery Technician I PCN 11-1906S held by Malcom Bennet.

King Cove personnel will consist of a Fishery Biologist I, PCN 11-1352S held by Mark Weinberger, a Fishery Technician I, PCN 11-1776S presently vacant, and a Fishery Technician I, PCN 11-1467S presently vacant.

BUDGET

The FY89 remaining budget will be sufficient to operate the project through 30 June 1989.

The FY90 budget request of \$71,100 if approved will be sufficient to implement the Port Moller sampling proposal from 1 July 1989 through 4 September 1989 and from 1 June through 30 June 1990 and the King Cove sampling proposal from 1 July through 21 August 1989 and from 8 June through 30 June 1990.

PROCEDURES

A general overview of the Alaska Peninsula fisheries is found in Appendix A.

Dates of Sampling Events

The sampling crew in Port Moller is expected to begin collection of AWL data on 5 June or 6 June, when fish become available during the standard Monday through Thursday commercial fishing period, and complete sampling on approximately 2 September. The Port Moller crew will be responsible for catch sampling the commercial fisheries on the North Peninsula and possibly South Peninsula commercial fisheries if delivered to Port Moller and unavailable to the sampling crew in King Cove. The fishing areas for the Alaska Peninsula - Aleutian Islands are in Table 1.

The sampling crew in King Cove is expected to begin collection of AWL data on June 9 or 10 June when fish become available during openings established by emergency order on the June migratory stocks and complete sampling on approximately 25 August. The South Unimak and Shumagin Islands June fishery management plan is found in Appendix B. The Southeast Mainland area fishery management plan is found in Appendix C. The King Cove crew will be responsible for catch sampling the commercial fisheries on the South Peninsula; primarily South Unimak, Shumagin Islands, the Southeast Mainland area, and Uria Bay.

Table 1. Alaska Peninsula fishing areas.

Fishing Area	Statistical Numbers
<u>SOUTH ALASKA PENINSULA</u>	
Southeast District Mainland	283-75, 283-80, 283-90, 281-10, 281-20, 281-31, 281-32, 281-33, 281-35
Shumagin Islands Section	282-11, 282-12, 282-13, 282-14, 282-21, 282-22, 282-23, 282-24, 282-25, 282-26
Canoe Bay	283-63, 283-64
Pavlof Bay	283-61, 283-62, 283-65, 283-70
Volcano Bay	283-52, 283-51
Belkofski Bay	283-42, 283-41
King Cove	283-33
Cold Bay	283-32, 283-34, 283-35
Thin Point	283-20
Morzhovoi Bay	283-12
Sanak Islands, Bechevin Bay, and Ikatan Bay through Cape Lazaref (June)	284-40, 284-50, 284-60, 311-60, 283-10
Ikatan Bay through Cape Aksit (July-Sept)	284-40, 284-50, 284-60
Cape Lutke	284-20
Sanak Islands (July-Sept)	283-10
<u>NORTH ALASKA PENINSULA</u>	
Urilia Bay Section	311-32, 311-42
Swanson's Lagoon Section	311-52
Bechevin Bay (July-Sept)	311-60

-Continued-

Table 1. (page 2 of 2)

Fishing Area	Statistical Numbers
Izembek-Moffet Bay	312-10, 312-20, 312-40
Nelson Lagoon Section	313-30
Herendeen Bay	314-20
Moller Bay	314-30
Harbor Point to Cape Seniavin	314-12, 315-11, 315-20
Cape Seniavin to Strogonof Point	316-10, 316-20, 316-25
Ilnik Lagoon	316-22
Inner Port Heiden	317-20
Outer Port Heiden	317-10
Cinder River	318-20
<u>ALEUTIAN ISLANDS AREA</u>	
Akutan District	302-15, 302-16, 302-17, 302-18, 302-19
Unalaska District	302-21, 302-22, 302-23, 302-24, 302-25 302-30, 302-31, 302-50, 302-51, 302-60 302-70, 302-80, 302-90

Samples from the designated areas are to be representative. To ensure that this occurs mixed loads from multiple areas will not be sampled nor will there be any pre-selection of fish for length, sex, or condition.

To ensure that samples are not missed the crews will begin sampling the first day the respective species catches are delivered from the designated sampling areas each statistical week. A list of the 1989 statistical weeks with corresponding calendar dates is in Table 2.

South Unimak and Shumagin Islands, June

During June a fishing period will be defined as any opening. The openings are established by the Area Management Biologist, Arnie Shaul. For all other areas and times the period is defined as the statistical week in which the fish are caught, which may differ from the sampling date. A sample size of 600 for each statistical week for sockeye and chum salmon from each fishing area will be obtained so that the sample is representative of the catch. During June for the South Unimak and Shumagin Islands Section fisheries each statistical week may have from one to four periods. The sample size per statistical week is 600 samples per species per area to be sampled as the first fish become available during the statistical week. For sockeye only, samples of a maximum of 200 will also be taken during each subsequent fishing period within that statistical week.

Table 2. 1989 statistical weeks.

Statistical Week	Calendar Dates	Statistical Week	Calendar Dates
1	01-Jan to 07-Jan	28	09-Jul to 15-Jul
2	08-Jan to 14-Jan	29	16-Jul to 22-Jul
3	15-Jan to 21-Jan	30	23-Jul to 29-Jul
4	22-Jan to 28-Jan	31	30-Jul to 05-Aug
5	29-Jan to 04-Feb	32	06-Aug to 12-Aug
6	05-Feb to 11-Feb	33	13-Aug to 19-Aug
7	12-Feb to 18-Feb	34	20-Aug to 26-Aug
8	19-Feb to 25-Feb	35	27-Aug to 02-Sep
9	26-Feb to 04-Mar	36	03-Sep to 09-Sep
10	05-Mar to 11-Mar	37	10-Sep to 16-Sep
11	12-Mar to 18-Mar	38	17-Sep to 23-Sep
12	19-Mar to 25-Mar	39	24-Sep to 30-Sep
13	26-Mar to 01-Apr	40	01-Oct to 07-Oct
14	02-Apr to 08-Apr	41	08-Oct to 14-Oct
15	09-Apr to 15-Apr	42	15-Oct to 21-Oct
16	16-Apr to 22-Apr	43	22-Oct to 28-Oct
17	23-Apr to 29-Apr	44	29-Oct to 04-Nov
18	30-Apr to 06-May	45	05-Nov to 11-Nov
19	07-May to 13-May	46	12-Nov to 18-Nov
20	14-May to 20-May	47	19-Nov to 25-Nov
21	21-May to 27-May	48	26-Nov to 02-Dec
22	28-May to 03-Jun	49	03-Dec to 09-Dec
23	04-Jun to 10-Jun	50	10-Dec to 16-Dec
24	11-Jun to 17-Jun	51	17-Dec to 23-Dec
25	18-Jun to 24-Jun	52	24-Dec to 30-Dec
26	25-Jun to 01-Jul	53	31-Dec to 31-Dec
27	02-Jul to 08-Jul		

Catch Sampling

Specific procedures for collecting and recording salmon age (scales), length, and sex data are in Appendix E and F. The accuracy of the data is the responsibility of the crew leaders. All questions concerning collection procedures should be brought to the attention of the ARB at the first available opportunity. The ARB is available via radio or telephone.

For the June South Unimak and Shumagin Islands Section fisheries a sockeye salmon subsample of a 200 fish sample from the first opening and a 200 fish sample taken during subsequent fishing periods of a statistical week will be copied and sent to King Salmon for analysis by the Bristol Bay staff. Xerox copies of AWL forms and the second pressing of the scales will be mailed as soon after collection as possible; there are usually two weekly mail flights from King Cove and Port Moller to Cold Bay, which has daily mail service. Mail flights are usually on Tuesdays and Fridays. Telephone contact with the individual responsible for AWL analysis at King Salmon will be made to notify the staff of incoming data. All original samples taken in Port Moller will remain there. Periodically in-season, the samples collected in King Cove or elsewhere will be sent to Port Moller. To ensure safe delivery of data, notify the crew leader before and following the sending of data. To ensure safe delivery notify the crew leader: 1) that the data is being mailed (use a moisture proof container); 2) what data is being sent; 3) when delivery is expected in Port Moller; and 4) who is transporting the data. It is important that these steps are followed to ensure delivery. The crew leader at King Cove will maintain a log book of all outgoing catch samples.

Sockeye (Table 3) and chum (Table 4) salmon sampling are the number one priority of sampling during all periods from the specified fishing areas. Chinook (Table 5) and coho (Table 6) salmon will also be sampled as time allows. Major fishing areas with the approximate statistical week for peak run timing is presented in Table 7.

The King Cove crew will be responsible for pressing all scales collected in King Cove and the Port Moller crew will be responsible for pressing all scales collected in any other location. The ARB or trained seasonals will read all scales collected in-season.

All crews will sample the first day of each designated statistical week as the salmon become available. For each AWL sample, scales from the preferred area will be taken, sex determined and length from mid-eye to fork of tail recorded as defined in Appendix E and F.

Weight-length sampling of salmon will occur in all major fisheries for the development of weight-length relationships. For all interception fisheries (i.e., Cape Lutke, Ikatan Peninsula-Cape Lazaref, Shumagin Islands Section, Southeast District Mainland for sockeye salmon, Cape Seniavin-Strogonof Point, Harbor Point-Cape Seniavin) 100 weights and corresponding fish lengths for sockeye and chum salmon will be taken the first week fish are available (Table 8). Thereafter 50 to 100 weight-length fish relationship samples will be taken every other week from interception fisheries.

Samples will be randomly selected so as to be representative of the harvest.

Table 3. Sockeye salmon sampling events for each month by statistical week.

	<u>June</u>				<u>July</u>				<u>August</u>				
	23	24	25	26	27	28	29	30	31	32	33	34	35
<u>SOUTH PENINSULA</u>													
Southeast District Mainland	1	1	1	1	1	1	1	1	1	1	1	1	1
Shumagin Islands Section		1	1	1	1	1	1	1	1	1	1	1	
Thin Point Bay								1	1	1	1		
Morzhovoi Bay							1	1	1				
Ikatan - Lazaref (June)		1	1	1									
Ikatan - Cape Aksit (July-Sept)					1	1	1	1	1	1	1	1	1
Cape Lutke		1	1	1									
<u>NORTH PENINSULA</u>													
Urilia Bay		1	1	1	1								
Izembek									1	1			
Nelson Lagoon				1	1	1	1	1	1	1	1		
Harbor - Seniavin	1	1	1	1	1	1	1	1	1	1	1	1	1
Seniavin - Strogonof			1	1	1	1	1	1	1	1	1	1	1

Table 4. Chum salmon sampling events for each month by statistical week.

	June				July				August				
	23	24	25	26	27	28	29	30	31	32	33	34	35
<u>SOUTH PENINSULA</u>													
Southeast Mainland area			1	1	1	1	1	1	1	1	1	1	1
Shumagin Island	1	1	1		1	1	1	1	1	1	1	1	1
Canoe Bay					1	1	1	1	1	1	1		
Volcano Bay						1	1		1				
Belkofski Bay									1	1	1		
Cold Bay								1	1	1			
Morzhovoi Bay									1	1	1		
Ikatan - Cape Aksit (July-Sept)					1	1	1	1	1	1	1	1	1
Ikatan - Lazaref (June)	1	1	1										
Cape Lutke	1	1	1										
<u>NORTH PENINSULA</u>													
Swanson's Lagoon				1	1	1	1						
Izembek - Moffet Lagoon					1	1	1	1	1	1			
Nelson Lagoon							1	1	1	1	1		
Herendeen Bay					1	1	1						
Harbor - Seniavin				1	1	1	1	1	1				
Seniavin - Strogonof							1	1	1				
<u>ALEUTIAN ISLANDS</u>													
(when available)													

Table 5. Chinook salmon sampling events for each month by statistical week.

	JUNE				JULY			
	23	24	25	26	27	28	29	30
<u>SOUTH PENINSULA</u>								
Ikatan - Lazaref			1	1				
Shumagin Islands			1	1	1			
Cape Lutke			1	1				
<u>NORTH PENINSULA</u>								
Nelson Lagoon	1	1	1	1	1	1	1	
Harbor - Seniavin	1	1	1	1	1			
Seniavin - Strogonof				1	1	1	1	

Table 6. Coho salmon sampling events for each month by statistical week.

	<u>JUNE</u>				<u>JULY</u>				<u>AUGUST</u>					<u>SEPTEMBER</u>		
	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
<u>SOUTH PENINSULA</u>																
Shumagin Islands			1	1		1	1	1	1	1	1	1	1	1		
Ikatan Bay						1	1	1	1	1	1					
<u>NORTH PENINSULA</u>																
Harbor - Seniavin									1	1	1	1	1	1		
Seniavin - Stroganof										1	1	1	1	1	1	
Nelson Lagoon										1	1	1	1	1	1	
Swanson's Lagoon														1	1	1

Table 7. Major fishing areas with approximate statistical week for peak run timing.

Area	Statistical Run Peak			
	Chinook	Sockeye	Chum	Coho
Shumagin Islands June	24	24	24	26
Shumagin Islands July - Sept.	31	30	30	31
Southeast District Mainland ¹		24	24	
Southeast District Mainland ²		29	29	
Southeast District Mainland ³		31	30	32
Canoe Bay			30	
Ikatan Peninsula-Cape Lazaref (June)	24	24	24	
Ikatan Peninsula-Cape Aksit (July-Sept)		30	31	31
Cape Lutke	24	24	24	
Urilia Bay		27		
Izembek-Moffet Lagoon			31	
Nelson Lagoon	25	28	30	35
Herendeen Bay			30	
Harbor Point-Cape Seniavin	26	28	28	35
Cape Seniavin-Strogonof Point	27	28	28	36

¹Open to set net gear only prior to 11 July.

²Open to set net gear for entire area and purse seine gear north of Renshaw Point to Osterback Creek from 11 July through 25 July.

³Open to set net and purse seine gear over entire area.

Table 8. Alaska Peninsula listing of fishing areas and the corresponding species where weight-length data will be collected.

	Chinook	Sockeye	Chum	Coho
<u>SOUTH PENINSULA</u>				
Southeast District Mainland		X	X	
Shumagin Islands Section		X	X	
Canoe Bay		X		
Volcano Bay			X	
Belkofski Bay			X	
Cold Bay			X	
Morzhovoi Bay			X	
Ikatan Peninsula to Cape Lazaref (June)		X	X	
Cape Lutke (June)		X	X	
Urilia Bay		X		
Izembek-Moffet Bay Section			X	
Nelson Lagoon Section	X	X	X	X
Herendeen Bay			X	
Harbor Point to Cape Seniavin	X	X	X	X
Cape Seniavin to Strogonof Point		X	X	X

For all terminal fisheries (i.e., Southeast District Mainland for chum salmon, Canoe Bay, Cold Bay, Morzhovoi Bay, Urilia Bay, Izembek-Moffet Bay Section, Nelson Lagoon Section, Herendeen Bay) 100 weights and corresponding fish lengths for chinook, sockeye, chum, and coho will be taken the first week fish are available (Table 8). Thereafter 50 to 100 weight-length fish relationship samples will be taken every other week, until a maximum of 250 samples for each species for each fishery is collected. The weight-length data will be analyzed in-season by the ARB for development of average fish weights by species by fishery. The average weights will be given to the AMB, Arnie Shaul, for editing fish tickets.

Length sampling of salmon will be limited to the terminal fisheries, escapements, and the South Unimak-Shumagin Island June Fishery except where lengths are needed for weight-length relationships. In interception and mixed local stock fisheries, length samples have questionable utility. An exception in the South Unimak-Shumagin Island June Fishery where the length data is used for in-season forecasting by Bristol Bay staff. Each fish sample sent to King Salmon for analysis will have the associated length data. For terminal catches the standard 600 lengths per week will be maintained to provide an adequate sample of the younger age fish for forecasting.

Data collected in 1988 indicated that a yearly 250 fish sample of length-weight statistics usually provides a level of precision of $\pm .1$ pound, which is our goal.

In some instances it will be easier to collectively weigh up to several hundred fish in a brailer. For instance, when a seine vessel is unloading.

An adequate length-weight relationship can be developed by obtaining the weight of a brailer of fish if the exact number and weight of the brailer of fish is known, also the brailer must contain only one species. To ensure the correct number of fish in a brailer, ADF&G personnel must count the number of fish in the brailer. This can be accomplished by visually counting the fish pitched into the brailer with the aid of a tally counter. If the above rules are true then give the ARB the number of fish, their weight, species, and area of catch. In this instance we will not collect length data for a length-weight relationship, only the weight data. The data collected using this mehtod will not provide confidence levels for a weight-length relationship but the 1988 data indicated a 250 fish sample would be adequate.

Table 9 lists the catch areas which support specific stock fisheries where length data will be collected.

All crews should report all fin clipped and/or tagged fish. For chinook salmon having a clipped adipose fin, the head should be sent frozen in a ziplock baggy to Andy McGregor, ADF&G, Juneau, Alaska. If a tagged fish is found the crew leader should record the catch location, catch date, gear type, species, tag number, type of tag, length, weight, and age of the fish.

Crews are to anticipate supply shortages in-season and to notify the ARB before the supplies are exhausted.

Each crew leader will keep a daily log book of activities. A report from each crew leader outlining problems encountered and solutions as well as any

Table 9. List of catch areas which support specific stock fisheries.

Fishing Area	Statistical Numbers
<u>SOUTH ALASKA PENINSULA</u>	
Southeast District Mainland	281-10, 281-20, 281-31, 281-32, 281-33, 281-35, 283-75, 283-80, 283-90
Shumagin Islands Section	282-11, 282-13, 282-21, 282-22, 282-23, 282-24, 282-25, 282-26
Canoe Bay	283-63, 283-64
Long Beach	283-61
Volcano Bay	283-52
Belkofski Bay	283-42
Cold Bay	283-34, 283-35
Thin Point	283-20
Morzhovoi Bay	283-21
Ikatan-Lazaref	284-40, 284-50, 284-60
Sanak Island	283-10
Cape Lutke	284-20
<u>NORTH ALASKA PENINSULA</u>	
Urilia Bay	311-32
Swanson Lagoon	311-42
Bechevin Bay	311-60
Izembek-Moffet Lagoon	312-20, 312-40
Nelson Lagoon	313-30
Herendeen Bay	314-20
Ilnik Lagoon	316-20

suggestions for the project should be turned into the ARB at the end of the season.

Appendix F contains the Alaska Peninsula-Aleutian Islands Area management plans. The catch sampling crews should familiarize themselves with the document.

Appendix G contains general equipment, cabin maintenance, and crew policy.

Appendix H contains information on first aid and safety.

Equipment, food, and other items remaining at the end of the season will be sent to Cold Bay, Port Moller, or Kodiak for winterization; contact the ARB for winterization arrangements.

DATA ANALYSIS AND REPORTING

The sample sizes are statistically arrived at to include necessary criteria to address problems that may affect the accuracy and precision of age composition work or stock composition methodologies (Appendix K). The Peninsula catch sampling crews will be collecting samples of 600 per statistical week per fishing area. A 600 fish sample provides 510 readable scales which give a 95% simultaneous confidence level of age classes at less than plus or minus 5%.

The age composition and associated standard errors will be computed for all samples. Mean length data by age and sex will be presented. The sex composition will be computed by statistical week.

Prior to 1 June 1990 the ARB will author a Technical Fisheries Report and a Regional Information Report which covers the results of the 1989 catch sampling season.

NEW PROJECTS

Digitizing

ADF&G is attempting to separate sockeye stocks in mixed stock fisheries. North Peninsula sockeye fisheries from Port Moller to Strogonof Point and all escapement samples of sockeye scales and associated, completed Opscan Forms will be sent to Charlie Swanton (ADF&G, Kodiak) for digitizing. Hal Giger will work with Charlie Swanton to develop models which may allocate the catch to the stream of origin for sockeye salmon. Use the same procedures for mailing data from Port Moller to Kodiak as is used in mailing data from various locations into Port Moller. If possible send in the data with ADF&G personnel going to Kodiak.

Parasites

Another promising method for sockeye stock identification may be the presence or absence of the brain parasite Myxobolus. The parasite had 100% presence in a sample from Sapsuk Lake in 1988 and has not been found in Bristol Bay. Send a 50-100 frozen fish head sample from known escapements (Thin Point,

Urilia Bay, Nelson Lagoon, Bear Lake, Ilnik Lagoon, Sandy Lake, and Meshik River) to:

Adam Moles
Auke Bay Lab
P.O. Box 210155
Auke Bay, Alaska 99821

with accompany data on date of collecting sample, system, and a map with system highlighted.

Make sure the samples are pure (No mixed stocks).

Secchi Disk

See Appendix I.

Water Samples

See Appendix J.

LITERATURE CITED

ADF&G (Alaska Department of Fish and Game). 1985. An atlas to the catalog of waters important for spawning, rearing or migration of anadromous fishes. Southwestern Region, Resource Management, Region III. Division of Habitat, Anchorage, Alaska.

Shaul, A.R. and L.J. Schwarz. 1989. 1988 Alaska Peninsula-Aleutian Islands Areas salmon and herring annual management report. Regional Information Report No. 4K89-11, Alaska Department of Fish and Game, Division of Commercial Fisheries, Region IV Report, Kodiak.

APPENDIX A

General Overview of the Fisheries and Catch Sampling
Program for the Alaska Peninsula

A General Overview of the Fisheries and Catch Sampling Program for the Alaska Peninsula

January 1987

The fisheries in the Alaska Peninsula Area are complicated by the aspect of regional interception of stocks of sockeye and chum salmon passing through the area. The local geography poses difficulties in access to spawning streams for escapement sampling. The program will need to be initialized at a level necessary to provide initial information, and expanded as the basic information is analysed and needs of the area change.

General Objectives:

The general objective of the program is to determine the age composition of the catch of sockeye and chum salmon caught in the Alaska Peninsula fisheries and the age composition of the escapement of the major systems with a level of precision necessary for the development of brood tables for those major systems. The geographic logistical constraints particular to the area may require the definition of a major system to reflect an aggregate of spawning streams. The level of precision for the age composition of the catch is a simultaneous confidence level approach. The level of precision for the age composition of the escapement is one in which the escapement can be partitioned into the age class structure for any period of the run with an appropriate level necessary for accurate brood tables when combined with catch age composition for each stock. Length and sex data is obtained with each sample as listed in Table 8.

CATCH SAMPLING

Sampling Locations:

The catch sampling would occur at Port Moller and King Cove where the majority, 80%, of the fish are delivered. The tender schedules and locations will allow the sampling of pure loads obtained from the separate areas. Additional sampling may occur at Canoe Bay and Dutch Harbor. The basis of the mechanism is knowing where the tenders are loading fish. With the set gillnet fishery on the southside, the tenders run a circuit to the sites. On the southside, the tenders land in both Sand Point and King Cove, with the majority landing in King Cove. The accurate identification of area of catch for each tender will allow terminal purse seine chum (and one sockeye) catch area to possibly be used as escapement sampling.

Sockeye Salmon Catch Sampling:

A total encompassing sockeye catch sampling program has the possibility of providing age and length data for the following areas:

- S-1) Cape Seniavin to Strogonof Point (316): local interception fishery on mixed sockeye stocks from Nelson Lagoon, Bear River, Sandy River, Ocean River, and Ilnik Lagoon.

- S-2) Harbor Point to Cape Seniavin (314-12, 315-11, 315-20): local interception fishery on mixed sockeye stocks from Sandy River, Bear River, and Nelson Lagoon system.
- S-3) Nelson Lagoon (313-30): terminal sockeye fishery on Nelson Lagoon System (Hoodoo Lake-Sapsuk River is major component with 95% of the escapement).
- S-4) Urilia Bay (311-32): terminal sockeye fishery on Urilia Bay tributaries.
- S-5) Cape Lutke (June) (284-20): mixed stock interception sockeye fishery.
- S-6) Ikatan/Lazaref (June) (284-40,50,60, 311-60): mixed stock interception sockeye fishery.
- S-7) Southwestern and Southcentral Districts combined: mixed stock interception sockeye fishery.
- S-8) Shumagin Islands (June) (282-10,11): mixed stock interception sockeye fishery.
- S-9) Southeast Mainland area (Beaver Bay, Balboa Bay, and west and east Stepovak 283-75,80,90, 281-10,20,31,32,33,35): mixed stock interception sockeye fishery.

Chum Salmon Catch Sampling:

A totally encompassing chum catch sampling program, including expansion of the project in King Cove for July and August, has the possibility of providing age and length data for the following areas:

- C-1) Herendeen Bay (314-20): terminal chum fishery.
- C-2) Nelson Lagoon (313-30): terminal chum gillnet fishery.
- C-3) Izembek/Moffet Bay (312-10,20,40): terminal chum fishery.
- C-4) Cape Lutke (284-20): mixed stock interception chum fishery; June fishery is sockeye with chum catch as incidental.
- C-5) Ikatan/Lazaref (284-40,50,60, 311-60): mixed stock interception chum fishery (after 1 July); June fishery is sockeye with chum catch as incidental.
- C-6) Ikatan (284-60): mixed stock interception chum fishery.
- C-7) Morzhovoi Bay (283-12): mixed stock interception and terminal chum fishery.
- C-8) Cold Bay (283-34,35): mixed stock interception and mixed stock terminal (Russel Creek and Lenard Harbor) chum fishery.
- C-9) Belkofski (283-42): terminal chum fishery.

- C-10) Volcano Bay (283-52): mixed stock interception chum fishery.
- C-11) Pavlof Bay (283-63,65): mixed stock interception chum fishery.
- C-12) Canoe Bay (283-63,64): terminal chum fishery.
- C-13) Shumagin Islands (282-11,12,13,21,22,23,24,25,26): mixed stock interception chum fishery (after 1 July); June fishery is sockeye with chum catch as incidental.
- C-14) Southeast Mainland area (283-75,80,90, 281-10,20,31,32,33,35) (Beaver Bay, Balboa Bay, and west and east Stepovak): (10 July-15 August): terminal chum fishery in several areas (seines); two-four tenders operating out of King Cove at any one time; catch area indicates escapement system; otherwise-mixed stock interception fishery.

The responsibility of proper identification of area of catch will be a necessary component of the dockside catch sampling.

The timing of the fisheries is provided in Appendix A.1. Catch data by system for sockeye and chum salmon is provided in Appendices A.2 and A.3 respectively. The percentage catch by system for sockeye and chum salmon is provided in Appendices A.4 and A.5 respectively. The escapement numbers by system for sockeye and chum salmon is provided in Appendices A.6 and A.7 respectively. The percentage escapement by system for sockeye and chum salmon is provided in Appendices A.8 and A.9 respectively.

ESCAPEMENT SAMPLING

Sockeye Salmon Escapement Sampling:

The systems that have made up the major portion of Alaska Peninsula escapement in the past five years are Bear River and Nelson Lagoon. Bear River has weir escapement counts and Sapsuk River (Nelson Lagoon) has tower escapement counts. Both rivers have had previous work on age composition. The samples at Bear River have allowed an analysis of temporal changes in age composition. The results indicate that there is a temporal change in age composition. The next highest 5-year average escapement system is the Ilnik system in which the escapement was sampled for the first time in 1986. The opportunity exists for the fourth largest escapement system (Urilia Bay) to be sampled during the catch sampling. If the Urilia Bay terminal fishery is totally purse seine, as it was in 1985 or 95% as in 1987, the catch samples will provide escapement AWL information during the period of the fishery. Other sockeye systems would require a 2-3 person crew to be flown into the area for 1-4 days for sampling to occur.

Escapement Enumeration:

The sockeye escapement enumeration on the systems that do not have towers and for enumeration of spawning areas downstream from the towers will be dependent upon the frequency and accuracy of aerial surveys. The frequency of aerial surveys should be increased on major systems and index streams

should be used on less important systems which are similar in species composition, run timing, fishing effort and in geographical proximity. The Ilnik and Thin Point systems should be used as a bench mark to determine bias problems and accuracy levels of aerial survey method.

Chum Salmon Escapement Sampling:

Several terminal areas can be sampled for chum escapement age composition by sampling the catch. The basis for this is due to the results of previous work indicating that purse seine caught fish show the same age composition as weir caught fish, both chum and sockeye. Other areas are not terminal seine fisheries, but are mixed stock interception fisheries. The other systems that could be handled during catch sampling occur in the Southeast Mainland area after 10 July. Several terminal fisheries exist and the catch sample could be linked to the single systems.

The relative level of chum escapement for the Alaska Peninsula is provided in Appendix A.5. The Izembek/Moffet, Herendeen and Canoe Bay systems accounted for approximately 55% of the estimated local stock escapement in the past six years. The systems sampled at the dock that have catch sample age composition used for escapement sampling are:

- 1) Izembek/Moffet Bay (312-20,40)
- 2) Herendeen Bay (314-20)
- 3) Belkofski (283-42)
- 4) Canoe Bay (283-64)

In all of these areas where the catch sample is used for escapement age/length/sex composition, the problem exists for sampling prior to the fishery, during closures and after the fishery. The fishery will stop if the chum get too dark or if the market is soft. In addition, the catch may be representative of milling fish and not reflect temporal changes in escapement age composition. Joshua Green River and Frosty Creek in the Izembek/Moffet system both have two runs. The early run on Frosty is prior to the fishery.

Appendix A.1. Alaska Peninsula fisheries gear and species 1987.

Location	G E A R	Time Period (weekly)												
		May	June			July			August			September		
			1	2	3	4	1	2	3	4	1	2	3	4
		:	:	:	:	:	:	:	:	:	:	:	:	:
<<<<< NORTH SIDE >>>><														
Port Heiden	DG/sg.	---	K	---										
Port Heiden	DG/SG.										---	Co	---	
Seniavin to Strogonof	DG							S	---					
Harbor Pt to Seniavin	DG							S	---					
Herendeen Bay	PS/bs							Ch	---					
Nelson Lagoon	SG/DG.							S	---					
Nelson Lagoon	SG/DG.	---	K	---										
Nelson Lagoon	SG/DG.								Ch	---				
Nelson Lagoon	SG/DG.										---	Co	---	
Izenbek/Moffet Bays	Bs/dg.								Ch	---				
Urilia Bay	BS/dg/				S	---								
<<<<< SOUTH SIDE >>>><														
Cape Lutke	PS/DG.								S	---				
Cape Lutke	PS/DG.								Ch	---				
Ikatan/Lazaref	PS/DG.				S	---	/			S	---			
Ikatan/Lazaref	PS/DG						/	Ch	---					
Ikatan/Lazaref	PS						/	P	---					
Ikatan/Lazaref	DG/PS											---	Co	
Morzhovoi Bay	PS/BS								Ch	---				
Morzhovoi Bay	BS/PS.								P	---				
Cold Bay	PS/BS.								Ch	---				
Cold Bay	BS/PS.								P	---				
Belkofski Bay	PS/BS.									Ch	---			
Belkofski Bay	BS/PS.								P	---				
Volcano Bay	PS/BS.								Ch	---				
Volcano Bay	BS/PS.								P	---				
Pavlof Bay	PS/BS								Ch	---				
Pavlof Bay (1)	BS/PS.								P	---				
Deer Island	BS/PS.								P	---				
Canoe Bay	PS/BS.								Ch	---				
Canoe Bay	BS/PS.								P	---				
Shumagin Islands	BS/PS							P	---					
Shumagin Islands	PS/sg.											---	Co	
Shumagin Islands	PS/sg.				S	---	/			S	---			
Shumagin Islands	PS/sg.						/	Ch	---					
Stepovak area	SG				S	---								
Stepovak area	SG/bs								S	---				
Stepovak area	PS/BS.								Ch	---				

-Continued-

Appendix A.1. (page 2 of 2)

Location	Time Period (weekly)														
	May			June			July			August			September		
	-----:														

<<<<<< Aleutian Island	.	:	.	.	.	:	.	.	.	:	.	.	.	:
Unalaska	PS	.	:	.	.	.	.	.	.	.	.	.	.	.
Unalaska	PS	.	:	.	.	.	.	.	.	.	.	.	.	.

(1) Even year starts in 2nd week July

GEAR: SG Set Gillnet S K King
 DG Drift Gillnet S Sockeye
 BS Beach Seine (acutally a small hand P Pink
 purse seine fished from vessel) Ch Chum
 PS Purse Seine Co Coho
 (lower case = minor usage)(listed in order of predominance)

Appendix A.2. Catch of sockeye salmon for major systems in the Alaska Peninsula.

District	Systems	District Number	1980	1981	1982	1983	1984	1985	1986
Northern District									
	Cinder River	318	0	0	0	100	0	300	700
	Port Heiden	317	24,600	3,800	8,800	100	1,700	5,100	38,000
	Three Hills & Ilnik	316	252,200	68,900	142,500	729,600	743,700	978,200	1,148,800
	Bear River	315	741,900	1,327,800	1,009,300	1,126,200	637,400	822,500	938,200
	Herendeen-Moller	314	10,500	18,600	11,300	15,000	31,400	4,500	1,300
	Nelson Lagoon	313	318,500	374,700	229,200	192,900	118,800	706,300	178,400
	Black Hills/ Caribou	313	0	0	400	0	0	0	0
	Subtotal		1,347,700	1,793,800	1,401,500	2,063,900	1,533,000	2,516,900	2,305,400
Northwestern District									
	Izembek/Moffet Bay	312	34,200	30,900	24,500	15,200	4,700	6,200	19,100
	Bechevin/Urilia Bays	311	15,200	20,100	9,300	14,300	197,000	76,400	139,200
	Subtotal		49,400	51,000	33,800	29,500	201,700	82,600	158,300
South Eastern District									
	East Stepovak		62,600	123,300	71,100	231,600	338,600	65,100	121,713
	West Stepovak		46,500	100,300	32,900	80,900	212,200	49,300	91,872
	Balboa Bay 283-80		19,100	36,900	13,900	75,300	108,800	21,300	28,661
	Beaver Bay 283-75		900	1,600	0	8,700	21,000	2,200	3,265
	Shumigan Islands		710,600	478,800	517,800	524,900	352,900	474,400	497,993
	Subtotal		839,700	740,900	635,700	921,400	1,033,500	612,300	743,504
South Central District 283									
	Mino Cr/L. Coal Bay		100	500	100	500	12,000	3,600	5,764
	Pavlof Bay -63		1,100	7,300	2,600	9,100	9,600	5,000	43,036
	Canoe Bay -64		1,400	2,700	400	1,100	1,000	3,100	466
	Subtotal		2,600	10,500	3,100	10,700	22,600	11,700	49,266
Southwestern District 283									
	Volcano Bay -52		600	800	70	30	1,600	13,800	8,680
	Belkofski Bay -42&33		20	500	100	10	30	300	400
	Cold Bay -34		2,100	5,700	400	200	2,200	800	2,171
	Thin Point -31		19,900	8,900	11,600	6,800	37,400	14,000	18,900
	Morzhovoi Bay -12		13,700	3,200	6,800	4,600	19,700	30,200	21,435
	Ikatan Bay -60		458,600	353,200	688,500	265,700	295,600	280,100	143,294
	Subtotal		494,920	372,300	707,470	277,340	356,530	339,200	194,880
Unimak District			284	2,731,000	1,474,000	1,670,000	1,545,000	1,118,000	1,251,400
TOTAL				5,465,320	4,442,500	4,451,570	4,847,840	4,265,330	4,814,100
									3,686,773

Appendix A.3. Catch of chum salmon for major systems in the Alaska Peninsula.

District	Systems	District Number	1980	1981	1982	1983	1984	1985	1986
Northern District									
	Cinder River	318	0	0	0	0	0	0	100
	Port Heiden	317	2,600	200	700	0	200	0	800
	Three Hills & IlNIK	316	29,700	7,100	21,200	26,100	174,200	86,600	38,700
	Bear River	315	161,700	155,000	142,400	87,700	242,300	68,300	86,700
	Herendeen-Moller	314	59,600	126,200	50,200	51,300	119,200	266,400	27,800
	Nelson Lagoon	313	80,100	62,800	21,400	14,000	78,400	6,600	3,600
	Black Hills/ Caribou	313	0	0	100	0	0	0	0
	Subtotal		333,700	351,300	236,000	179,100	614,300	427,900	157,700
Northwestern District									
	Izenbek/Moffet Bay	312	282,500	296,400	57,500	154,800	102,700	126,600	69,100
	Bechevin/Urilia Bays	311	85,000	59,100	37,700	14,900	79,800	116,500	44,500
	Subtotal		367,500	355,500	95,200	169,700	182,500	243,100	113,600
South Eastern District									
	East Stepovak		146,700	239,100	202,300	126,700	104,700	94,900	112,178
	West Stepovak		36,900	89,300	81,400	42,500	60,000	42,300	35,196
	Balboa Bay 283-80		17,000	85,800	102,700	77,400	88,600	29,600	19,950
	Beaver Bay 283-75		400	3,100	0	4,000	8,900	700	1,619
	Shumigan Islands		333,800	365,300	457,700	390,100	368,700	339,300	656,455
	Subtotal		534,800	782,600	844,100	640,700	630,900	506,800	825,398
South Central District 283									
	Mino Cr/L. Coal Bay		300	2,800	0	20	8,000	3,800	1,088
	Pavlof Bay -63		71,900	66,100	96,200	53,800	79,800	46,300	142,481
	Canoe Bay -64		118,500	168,600	140,100	74,800	223,300	115,800	111,266
	Subtotal		190,700	237,500	236,300	128,620	311,100	165,900	254,835
Southwestern District 283									
	Volcano Bay -51&52		62,300	118,000	66,400	31,400	91,200	170,200	133,212
	Belkofski Bay -42&33		47,900	58,300	47,400	22,000	68,600	68,800	108,234
	Cold Bay -34		31,000	23,400	37,700	1,700	47,200	47,200	58,330
	Thin Point -31		1,600	0	7,700	100	43,800	16,200	221
	Morzhovoi Bay -12		12,300	3,600	30,500	56,000	54,600	43,900	75,985
	Ikatan Bay -60		54,200	56,000	409,100	90,700	100,300	82,200	91,081
	Subtotal		209,300	259,300	598,800	201,900	405,700	428,500	467,063
Unimak District									
		284	457,000	521,000	934,000	615,000	223,000	291,900	201,943
TOTAL			2,093,000	2,507,200	2,944,400	1,935,020	2,367,500	2,064,100	2,020,539

Appendix A.4. Percentage catch of sockeye salmon for major systems in the Alaska Peninsula.

District	District Systems Number	1980	1981	1982	1983	1984	1985	1986
Northern District								
Cinder River	318	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Port Heiden	317	0.5	0.1	0.2	0.0	0.0	0.1	1.0
Three Hills & Ilnik	316	4.6	1.6	3.2	15.1	17.4	20.3	31.2
Bear River	315	13.6	29.9	22.7	23.2	14.9	17.1	25.5
Herendeen-Moller	314	0.2	0.4	0.3	0.3	0.7	0.1	0.0
Nelson Lagoon	313	5.8	8.4	5.1	4.0	2.8	14.7	4.8
Black Hills/ Caribou	313	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal		24.7	40.4	31.5	42.6	35.9	52.3	62.5
Northwestern District								
Izenbek/Moffet Bay	312	0.6	0.7	0.6	0.3	0.1	0.1	0.5
Bechevin/Urilia Bays	311	0.3	0.5	0.2	0.3	4.6	1.6	3.8
Subtotal		0.9	1.1	0.8	0.6	4.7	1.7	4.3
South Eastern District								
East Stepovak		1.1	2.8	1.6	4.8	7.9	1.4	3.3
West Stepovak		0.9	2.3	0.7	1.7	5.0	1.0	2.5
Balboa Bay 283-80		0.3	0.8	0.3	1.6	2.6	0.4	0.8
Beaver Bay 283-75		0.0	0.0	0.0	0.2	0.5	0.0	0.1
Shumigan Islands		13.0	10.8	11.6	10.8	8.3	9.9	13.5
Subtotal		15.4	16.7	14.3	19.0	24.2	12.7	20.2
South Central District 283								
Mino Cr/L. Coal Bay		0.0	0.0	0.0	0.0	0.3	0.1	0.2
Pavlof Bay -63		0.0	0.2	0.1	0.2	0.2	0.1	1.2
Canoe Bay -64		0.0	0.1	0.0	0.0	0.0	0.1	0.0
Subtotal		0.0	0.2	0.1	0.2	0.5	0.2	1.3
Southwestern District 283								
Volcano Bay -52		0.0	0.0	0.0	0.0	0.0	0.3	0.2
Belkofski Bay -42		0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cold Bay -34		0.0	0.1	0.0	0.0	0.1	0.0	0.1
Thin Point -31		0.4	0.2	0.3	0.1	0.9	0.3	0.5
Morzhovoi Bay -12		0.3	0.1	0.2	0.1	0.5	0.6	0.6
Ikatan Bay -60		8.4	8.0	15.5	5.5	6.9	5.8	3.9
Subtotal		9.1	8.4	15.9	5.7	8.4	7.0	5.3
Unimak District	284	50.0	33.2	37.5	31.9	26.2	26.0	6.4
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0

Appendix A.5. Percentage catch of chum salmon for major systems in the Alaska Peninsula.

District	District Systems Number	1980	1981	1982	1983	1984	1985	1986
Northern District								
Cinder River	318	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Port Heiden	317	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Three Hills & Ilnik	316	1.4	0.3	0.7	1.3	7.4	4.2	1.9
Bear River	315	7.7	6.2	4.8	4.5	10.2	3.3	4.3
Herendeen-Moller	314	2.8	5.0	1.7	2.7	5.0	12.9	1.4
Nelson Lagoon	313	3.8	2.5	0.7	0.7	3.3	0.3	0.2
Black Hills/ Caribou	313	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Subtotal		15.9	14.0	8.0	9.3	25.9	20.7	7.8
Northwestern District								
Izenbek/Moffet Bay	312	13.5	11.8	2.0	8.0	4.3	6.1	3.4
Bechevin/Urilia Bays	311	4.1	2.4	1.3	0.8	3.4	5.6	2.2
Subtotal		17.6	14.2	3.2	8.8	7.7	11.8	5.6
South Eastern District								
East Stepovak		7.0	9.5	6.9	6.5	4.4	4.6	5.6
West Stepovak		1.8	3.6	2.8	2.2	2.5	2.0	1.7
Balboa Bay 283-80		0.8	3.4	3.5	4.0	3.7	1.4	1.0
Beaver Bay 283-75		0.0	0.1	0.0	0.2	0.4	0.0	0.1
Shumigan Islands		15.9	14.6	15.5	20.2	15.6	16.4	32.5
Subtotal		25.6	31.2	28.7	33.1	26.6	24.6	40.9
South Central District 283								
Mino Cr/L. Coal Bay		0.0	0.1	0.0	0.0	0.3	0.2	0.1
Pavlof Bay -63		3.4	2.6	3.3	2.8	3.4	2.2	7.1
Canoe Bay -64		5.7	6.7	4.8	3.9	9.4	5.6	5.5
Subtotal		9.1	9.5	8.0	6.6	13.1	8.0	12.7
Southwestern District 283								
Volcano Bay -52		3.0	4.7	2.3	1.6	3.9	8.2	6.5
Belkofski Bay -42		2.3	2.3	1.6	1.1	2.9	3.3	5.4
Cold Bay -34		1.5	0.9	1.3	0.1	2.0	2.3	2.9
Thin Point -31		0.1	0.0	0.3	0.0	1.9	0.8	0.0
Morzhovoi Bay -12		0.6	0.1	1.0	2.9	2.3	2.1	3.8
Ikatan Bay -60		2.6	2.2	13.9	4.7	4.2	4.0	4.5
Subtotal		10.0	10.3	20.3	10.4	17.1	20.8	23.2
Unimak District	284	21.8	20.8	31.7	31.8	9.4	14.1	9.9
TOTAL		100.0	100.0	100.0	100.0	100.0	100.0	100.0

Appendix A.6. Escapement of sockeye salmon for major systems in the Alaska Peninsula.

District	Systems	District Number	1980*	1981*	1982*	1983*	1984*	1985	1986
Northern District									
	Cinder River	318	30,000	100,000	13,000	9,000	16,000	12,600	51,300
	Port Heiden	317	47,000	26,600	62,000	8,600	30,000	45,500	91,200
	Three Hills & Ilnik	316	100,000	151,000	43,000	40,100	22,300	22,700	74,700
	Bear River	315	751,000	741,500	361,300	358,000	414,000	451,500	283,900
	Herendeen-Moller	314	1,500	600	500	500	700	700	400
	Nelson Lagoon	313	352,600	251,000	179,600	128,800	251,000	314,800	123,300
	Black Hills/Caribou	313	3,900	4,000	6,000	2,600	600	3,700	3,100
	Subtotal		1,286,000	1,274,700	665,400	547,600	734,600	851,500	627,900
Northwestern District									
	Izenbek/Moffet Bay	312	11,500	12,000	21,500	18,500	19,100	17,200	29,200
	Bechevin/Urilia Bays	311	90,100	60,700	29,300	14,200	70,300	29,500	55,200
	Subtotal		101,600	72,700	50,800	32,700	89,400	46,700	84,400
South Eastern District									
	East Stepovak		0	0	0	0	0	0	0
	West Stepovak		12,000	18,000	9,100	21,500	18,600	14,000	21,000
	Balboa Bay 283-80		0	0	0	0	0	0	0
	Beaver Bay 283-75		0	0	0	0	0	0	0
	Shumigan Islands		6,300	4,000	10,000	10,000	10,600	7,800	8,500
	Subtotal		18,300	22,000	19,100	31,500	29,200	21,800	29,500
South Central District 283									
	Mino Cr/L. Coal Bay		1,100	500	800	1,600	100	500	100
	Pavlof Bay -63		1,900	5,500	1,000	1,100	700	900	3,000
	Canoe Bay -64		5,500	2,000	1,000	5,000	9,000	1,000	5,400
	Subtotal		8,500	8,000	2,800	7,700	9,800	2,400	8,500
Southwestern District 283									
	Volcano Bay -52		0	0	0	0	0	0	0
	Belkofski Bay -42		0	0	0	0	0	0	0
	Cold Bay -34		4,800	5,600	2,600	8,000	6,600	5,000	3,600
	Thin Point -31		12,000	7,500	8,800	6,500	7,000	4,600	29,200
	Morzhovoi Bay -12		1,300	1,200	4,200	3,700	500	2,100	11,100
	Ikatan Bay -60		1,000	1,400	1,700	1,800	1,800	3,900	3,600
	Subtotal		19,100	15,700	17,300	20,000	15,900	15,600	47,500
Unimak District 284									
			0	0	0	0	0	0	9,800
TOTAL			1,414,400	1,377,400	738,100	619,500	863,000	922,400	807,600

*Index escapement counts.

Appendix A.7. Escapement of chum salmon for major systems in the Alaska Peninsula.

District	Systems	District Number	1980*	1981*	1982*	1983*	1984*	1985	1986
Northern District									
	Cinder River	318	10,000	11,800	5,500	17,200	13,000	3,200	2,200
	Port Heiden	317	33,700	73,400	35,500	14,500	78,000	26,500	17,300
	Three Hills & Ilnik	316	10,000	11,000	1,000	11,200	4,000	200	0
	Bear River	315	20,000	27,200	42,400	15,000	7,000	5,200	6,700
	Herendeen-Moller	314	116,100	85,000	152,000	126,000	241,300	71,700	58,800
	Nelson Lagoon	313	164,000	57,000	29,100	14,000	49,000	13,000	7,200
	Black Hills/ Caribou	313	10,400	11,000	2,000	1,200	10,000	4,100	900
	Subtotal		364,200	276,400	267,500	199,100	402,300	123,900	93,100
Northwestern District									
	Izenbek/Moffet Bay	312	364,200	235,000	166,400	173,300	427,500	194,700	166,100
	Bechevin/Urilia Bays	311	41,100	29,600	20,100	15,500	30,400	25,700	36,900
	Subtotal		405,300	264,600	186,500	188,800	457,900	220,400	203,000
South Eastern District									
	East Stepovak		26,100	34,000	20,000	40,200	54,200	34,800	0
	West Stepovak		44,300	23,900	26,900	51,100	42,400	16,900	85,800
	Balboa Bay 283-80		28,300	42,000	14,000	46,600	35,700	17,500	38,600
	Beaver Bay 283-75		19,000	13,000	10,000	10,700	62,400	18,800	10,600
	Shumigan Islands		1,100	5,500	3,000	11,800	56,300	24,300	6,500
	Subtotal		118,800	118,400	73,900	160,400	251,000	112,300	141,500
South Central District 283									
	Mino Cr/L. Coal Bay		0	0	0	0	0	0	0
	Pavlof Bay -63		15,600	13,600	9,900	1,200	29,500	22,300	17,800
	Canoe Bay -64		107,200	102,500	119,200	156,500	165,500	150,100	68,500
	Subtotal		122,800	116,100	129,100	157,700	195,000	172,400	86,300
Southwestern District 283									
	Volcano Bay -52		11,900	30,400	56,000	37,700	79,800	49,300	81,900
	Belkofski Bay -42		31,500	34,900	24,100	16,900	50,500	31,100	62,900
	Cold Bay -34		50,600	50,400	74,600	33,500	78,000	75,200	119,700
	Thin Point -31		11,800	19,500	15,000	21,300	23,000	44,000	53,000
	Morzhovoi Bay -12		14,000	11,500	14,000	7,700	22,400	19,200	13,500
	Ikatan Bay -60		0	0	200	500	0	0	0
	Subtotal		119,800	146,700	183,900	117,600	253,700	218,800	331,000
Unimak District 284									
			1,000	100	0	0	0	0	0
TOTAL			1,131,900	922,300	840,900	823,600	1,559,900	847,800	854,900

* Index escapement counts.

Appendix A.8. Percent escapement of sockeye salmon for major systems in the Alaska Peninsula.

District	Systems	District Number	1980	1981	1982	1983	1984	1985	1986
Northern District									
	Cinder River	318	2.1	7.3	1.8	1.5	1.9	1.4	6.3
	Port Heiden	317	3.3	1.9	8.4	1.4	3.5	4.9	11.3
	Three Hills & Ilnik	316	7.1	11.0	5.8	6.5	2.6	2.5	9.2
	Bear River	315	53.1	53.8	49.0	57.8	48.0	48.9	35.1
	Herendeen-Moller	314	0.1	0.0	0.1	0.1	0.1	0.1	0.1
	Nelson Lagoon	313	24.9	18.2	24.3	20.8	29.1	34.1	15.2
	Black Hills/ Caribou	313	0.3	0.3	0.8	0.4	0.1	0.4	0.4
	Subtotal		90.9	92.5	90.2	88.4	85.1	92.3	77.6
Northwestern District									
	Izembek/Moffet Bay	312	0.8	0.9	2.9	3.0	2.2	1.9	3.6
	Bechevin/Urilia Bays	311	6.4	4.4	4.0	2.3	8.1	3.2	6.8
	Subtotal		7.2	5.3	6.9	5.3	10.4	5.1	10.4
South Eastern District									
	East Stepovak		0.0	0.0	0.0	0.0	0.0	0.0	0.0
	West Stepovak		0.8	1.3	1.2	3.5	2.2	1.5	2.6
	Balboa Bay 283-80		0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Beaver Bay 283-75		0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Shumigan Islands		0.4	0.3	1.4	1.6	1.2	0.8	1.0
	Subtotal		1.3	1.6	2.6	5.1	3.4	2.4	3.7
South Central District 283									
	Mino Cr/L. Coal Bay		0.1	0.0	0.1	0.3	0.0	0.1	0.0
	Pavlof Bay -63		0.1	0.4	0.1	0.2	0.1	0.1	0.4
	Canoe Bay -64		0.4	0.1	0.1	0.8	1.0	0.1	0.7
	Subtotal		0.6	0.6	0.4	1.2	1.1	0.3	1.1
Southwestern District 283									
	Volcano Bay -52		0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Belkofski Bay -42		0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Cold Bay -34		0.3	0.4	0.4	1.3	0.8	0.5	0.5
	Thin Point -31		0.8	0.5	1.2	1.0	0.8	0.5	3.6
	Morzhovoi Bay -12		0.1	0.1	0.6	0.6	0.1	0.2	1.4
	Ikatan Bay -60		0.1	0.1	0.2	0.3	0.2	0.4	0.5
	Subtotal		1.4	1.1	2.3	3.2	1.8	1.7	6.0
Unimak District 284									
			0.0	0.0	0.0	0.0	0.0	0.0	1.2
TOTAL			100.0	100.0	100.0	100.0	100.0	100.0	100.0

Appendix A.9. Percent escapement of chum salmon for major systems in the Alaska Peninsula.

District	Systems	District Number	1980	1981	1982	1983	1984	1985	1986
Northern District									
	Cinder River	318	0.9	1.3	0.7	2.1	0.8	0.4	0.3
	Port Heiden	317	3.0	8.0	4.2	1.8	5.0	3.1	2.0
	Three Hills & Ilnik	316	0.9	1.2	0.1	1.4	0.3	0.0	0.0
	Bear River	315	1.8	2.9	5.0	1.8	0.4	0.6	0.8
	Herendeen-Moller	314	10.3	9.2	18.1	15.3	15.5	8.5	6.9
	Nelson Lagoon	313	14.5	6.2	3.5	1.7	3.1	1.5	0.8
	Black Hills/ Caribou	313	0.9	1.2	0.2	0.1	0.6	0.5	0.1
	Subtotal		32.2	30.0	31.8	24.2	25.8	14.6	10.9
Northwestern District									
	Izembek/Moffet Bay	312	32.2	25.5	19.8	21.0	27.4	23.0	19.4
	Bechevin/Urilia Bays	311	3.6	3.2	2.4	1.9	1.9	3.0	4.3
	Subtotal		35.8	28.7	22.2	22.9	29.4	26.0	23.7
South Eastern District									
	East Stepovak		2.3	3.7	2.4	4.9	3.5	4.1	0.0
	West Stepovak		3.9	2.6	3.2	6.2	2.7	2.0	10.0
	Balboa Bay 283-80		2.5	4.6	1.7	5.7	2.3	2.1	4.5
	Beaver Bay 283-75		1.7	1.4	1.2	1.3	4.0	2.2	1.2
	Shumigan Islands		0.1	0.6	0.4	1.4	3.6	2.9	0.8
	Subtotal		10.5	12.8	8.8	19.5	16.1	13.2	16.5
South Central District 283									
	Mino Cr/L. Coal Bay		0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Pavlof Bay -63		1.4	1.5	1.2	0.1	1.9	2.6	2.1
	Canoe Bay -64		9.5	11.1	14.2	19.0	10.6	17.7	8.0
	Subtotal		10.8	12.6	15.4	19.1	12.5	20.3	10.1
Southwestern District 283									
	Volcano Bay -52		1.1	3.3	6.7	4.6	5.1	5.8	9.6
	Belkofski Bay -42		2.8	3.8	2.9	2.1	3.2	3.7	7.4
	Cold Bay -34		4.5	5.5	8.9	4.1	5.0	8.9	14.0
	Thin Point -31		1.0	2.1	1.8	2.6	1.5	5.2	6.2
	Morzhovoi Bay -12		1.2	1.2	1.7	0.9	1.4	2.3	1.6
	Ikatan Bay -60		0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Subtotal		10.6	15.9	21.9	14.3	16.3	25.8	38.8
Unimak District 284									
			0.1	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL			100.0	100.0	100.0	100.0	100.0	100.0	100.0

APPENDIX B

South Unimak and Shumagin Islands

June Fishery Management Plan

1989
SOUTH UNIMAK AND SHUMAGIN ISLANDS
JUNE FISHERY MANAGEMENT PLAN

by
Arnold Shaul

Regional Information Report¹ No. 4K89-10

Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road
Kodiak, Alaska 99615

April 1989

¹The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc information purposes or archive basic uninterpreted data. To accommodate needs for up-to-date information, reports in this series may contain preliminary data.

1989
SOUTH UNIMAK AND SHUMAGIN ISLANDS
JUNE FISHERY MANAGEMENT PLAN

The Alaska Board of Fisheries placed a 500,000 (fish) chum salmon ceiling on the South Unimak and Shumagin Islands fisheries combined. If this ceiling is reached, the fishery will be closed regardless of how many sockeye are left unharvested by the South Unimak-Shumagin Islands June fishery.

Based on the Bristol Bay forecast (as of March 18, 1988), the 1988 sockeye guideline harvest levels are as listed below. The forecast and guideline harvest levels are subject to change.

<u>Period</u>	<u>South Unimak</u>		<u>Shumagin Islands</u>	
June 1 - 11	5%	60,000	9%	24,000
June 12 - 18	29%	348,000	28%	74,000
June 19 - 25	51%	611,000	41%	108,000
June 26 - 30	15%	180,000	22%	58,000
Total	100%	1,199,000	100%	264,000

The total sockeye guideline harvest level for the South Unimak and Shumagin Islands June fisheries is 6.8% and 1.5% respectively of the 1989 inshore Bristol Bay sockeye catch forecast.

The Alaska Board of Fisheries has adopted commercial fishing time guidelines which are to be implemented in managing the South Unimak-Shumagin Islands June fishery.

There may not be more than 96 hours of fishing allowed during any seven day period and no more than 72 consecutive hours of fishing at any time. The fishery must be closed for at least 24 hours following any opening of 72 consecutive hours. It is the preference of the Board that no more than 48 consecutive hours be allowed unless circumstances such as weather or attainment of weekly guideline harvest levels require 72 consecutive hours of fishing.

Fishing periods will be announced by field emergency order, and they will be adjusted to keep the sockeye salmon harvest within the guidelines for a given guideline harvest level period, the unharvested sockeye will not be added into a subsequent period. If guideline harvest levels are inadvertently exceeded during any given fishing period, the excess sockeye will be a portion of the total guideline harvest level.

In order to reduce the probability of exceeding the 500,000 chum salmon catch ceiling it may be necessary to close specific locations if it is determined that the chum salmon catch per sockeye is substantially higher than in the balance of the fishery.

Due to the higher ratio of chums to sockeye salmon normally found during early June, a commercial salmon fishing period will not be established prior to June 9. The exact opening date during the June 9 - 11 period will depend on the general abundance of chums and the weather.

If the chum catch is substantial during June 9-11, the fishery will likely remain closed during the first two days of the June 12-18 period in hopes that the ratio of sockeye to chum will increase later in the period.

It may be necessary to announce very brief fishing periods and make decisions whether to extend the period or not based on verbal reports from the fishermen concerning the abundance of chums.

If catch rates are low and fishing time must be maximized, extensions of a fishing period may be made within several hours prior to the scheduled closure. The fishery may also be extended on short notice in order to achieve the sockeye guideline harvest levels if indications are that a high abundance of sockeye and relatively few chums are present.

Emergency orders will be relayed to the fishing fleet on SSB frequencies 3261 and 4125 VHF channel 6, and over A.M. radio station KSDP (in Sand Point).

APPENDIX C

Southeast Mainland Area

Fishery Management Plan

1989
SOUTHEASTERN DISTRICT MAINLAND (ALASKA PENINSULA AREA)
MANAGEMENT PLAN

By: ARNIE SHAUL AND LEN SCHWARZ

Regional Information Report¹ No 4K89-9

Alaska Department of Fish and Game
Division of Commercial Fisheries, Westward Region
211 Mission Road
Kodiak, Alaska 99615

April 1989

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1989
SOUTHEASTERN DISTRICT MAINLAND MANAGEMENT PLAN
ALASKA PENINSULA AREA

The Department will manage the Southeastern District Mainland fishery according to the Southeastern District Management Plan adopted by the Alaska Board of Fisheries. (See attached map).

The Northwest Stepovak and Stepovak Flats Sections will be managed on a local stock basis. When possible, fishing time in these sections will coincide with other nearby fisheries to avoid concentrating fishing gear.

Set gillnets are the only legal gear allowed in the Beaver Bay, Balboa Bay, Southwest Stepovak, Northwest Stepovak, East Stepovak, and Stepovak Flats Sections through July 10. After July 10, set gillnets, purse seines, and hand purse seines are legal.

The Beaver Bay, Balboa Bay, Southwest Stepovak, and East Stepovak Sections will be managed on the basis of Chignik sockeye stocks through July 25. After July 25, the whole area will be managed for local stocks.

The forecasted midpoint harvest for the Chignik sockeye returns during 1989 are 750,000 fish for the early return and 704,000 for the second return. If the return comes in as expected and the goals of the plan are achieved, approximately 80,000 estimated Chignik destined sockeye will be taken prior to July 26. This compares to a recent 5 and 10 year average of 144,000 and 125,000 respectively.

Since the harvestable surplus is expected to exceed 600,000 sockeye, the Southeastern District Mainland fishery may open when the fishery opens at Chignik. Based on the moderately strong forecast, it is possible that the first opening could be as early as June 8. At least 36 hours notice will be given prior to the first commercial fishing period in the Southeastern District

Mainland fishery. At least an 18 hour notice will be given prior to the opening of any other fishing period, unless it is an extension of a fishing period in progress. If the first run fails, the Southeastern District Mainland fishery will be curtailed in order to allow a minimum harvest in the Chignik Area of at least 300,000 sockeye through July 8 if that many are surplus to the escapement needs.

During the period from approximately June 26 to approximately July 9, the strength of the second run of Chignik River system sockeye salmon cannot be evaluated at Chignik Lagoon. To prevent overharvest of the second run, commercial salmon fishing in the Southeastern District Mainland will, in the Department's discretion, be disallowed or severely restricted during this period.

Fishing time in the Southeastern District Mainland after July 8 will be dependent upon the strength of the second run and on the Chignik Area catch during the first run. When the second run appears strong enough for a fishery at Chignik, the Southeastern District Mainland will be opened if at least 300,000 were harvested from the first run in the Chignik Area. The Department will then manage the fishery whereby the number of sockeye salmon harvested in the Chignik Area on both runs combined will be at least 600,000 and the harvest in the Southeastern District Mainland will approach as near as possible 6 percent of the total Chignik bound sockeye salmon catch^{1/}, if that many fish are available surplus to the escapement needs.

At the December 1982 meeting, the Board of Fisheries adopted the following regulation pertaining to fishery management plans:

¹ The total Chignik sockeye salmon catch constitutes those sockeye salmon caught within the Chignik Area plus 80 percent of the sockeye salmon caught in the Cape Igvak Section of the Kodiak Area plus 80 percent of the sockeye caught in the Southeastern District Mainland fishery outside of the Suzy Creek to Dent Point portion.

5 AAC 39.200 APPLICATION OF FISHERY MANAGEMENT PLANS

(b) In some fishery management plans, the distribution of harvestable fish between various users is determined by the harvest that occurs during a specific time period, at a specific location or by a specific group or groups of users. At times fishermen, due to circumstances that are beyond the control of the Department, such as weather or price disputes, will not harvest fish. When this happens in a fishery governed by a management plan the goals of that plan may not be achieved. Therefore, when a fishery is open to the taking of fish and the group or groups of users whose catch determines the distribution of the harvest as set out in the applicable management plan is not taking the harvestable fish available to them, the Department shall manage the fishery as if the available harvest is being taken. When determining the available harvest, the Department shall consider the number of fish needed to meet spawning requirements, the number of fish present in the fishery and in spawning areas that are in excess to spawning requirements and the estimated harvesting capacity of the group or groups of users that would normally participate in the fishery.

The fishery shall be managed according to the plan as stated in the 1988-89 regulation book. No attempt will be made to allow equal fishing time with Chignik, as had been done at one time, but rather the end goal will be to meet the 6 percent allocation levels after the conditions^{2/} of the plan have been satisfied. To meet the goal of 6 percent by July 25, the percentage may fluctuate above or below 6 percent prior to July 25.

² Conditions include daily escapement goals at Chignik, a minimum Chignik sockeye harvest for each run, and restrictive fishing time in the Cape Igvak section and Southeastern District Mainland during the June 26 to July 9 overlap period. The total minimum harvest for Chignik is listed under 5 AAC 09.360 on pages 36 and 37 in the 1988-89 Commercial Finfish Regulation booklet.

Because of the many restrictions placed upon the Southeastern District Mainland fishery to protect the Chignik runs, it may not be possible to achieve a 6 percent allocation level even though the minimum catch level of 600,000 at Chignik is exceeded.

SOUTHEASTERN DISTRICT

STEPOVAK FLATS SEC.

NORTHWEST STEPOVAK SEC.

EAST STEPOVAK SEC.

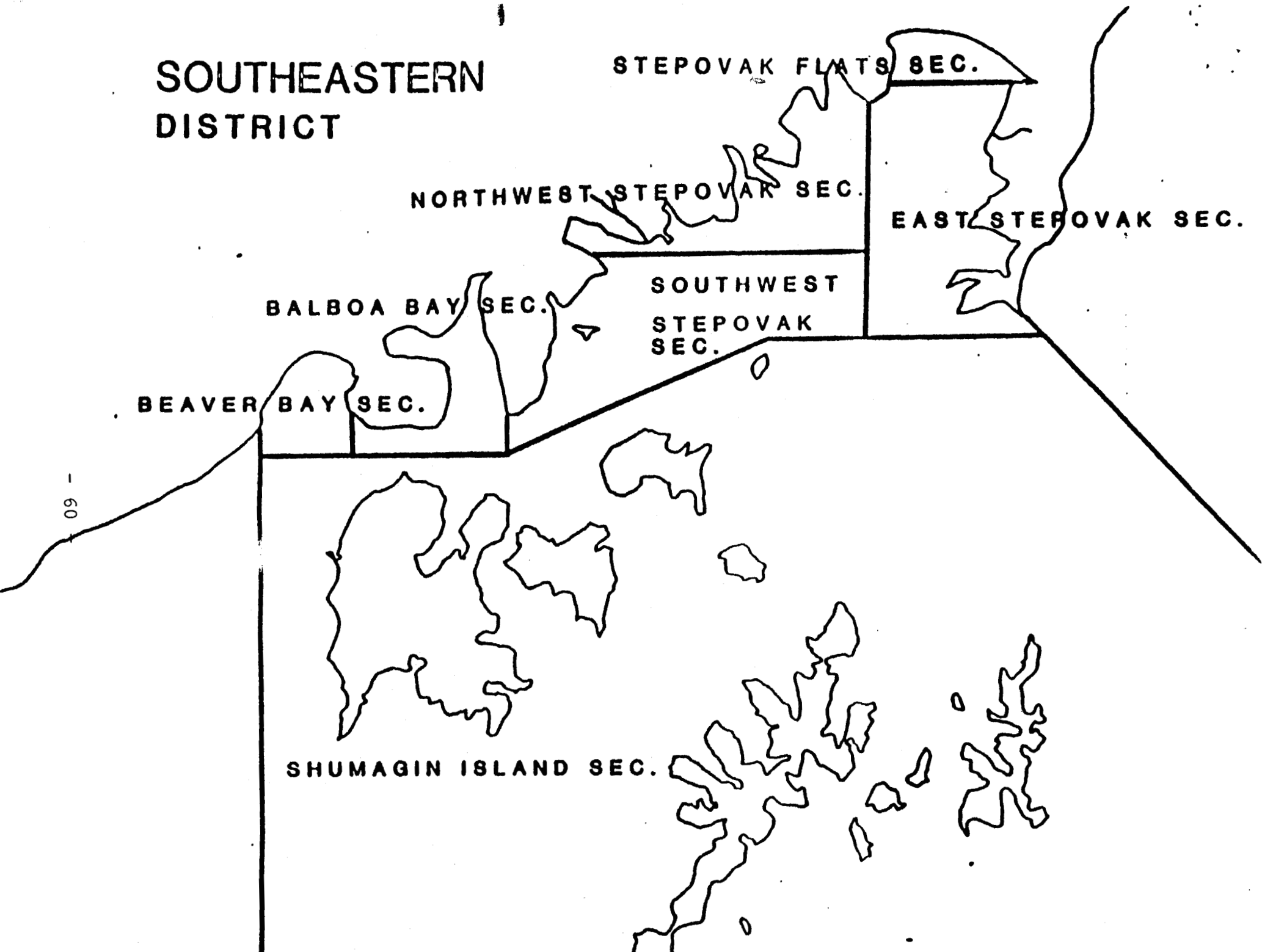
BALBOA BAY SEC.

SOUTHWEST
STEPOVAK
SEC.

BEAVER BAY SEC.

09 -

SHUMAGIN ISLAND SEC.



APPENDIX D

Alaska Peninsula Scale Sampling Technique

ALASKA PENINSULA SCALE SAMPLING TECHNIQUE

The following is an explanation of how salmon scale samples are taken. If you have not taken scales before or if you have any questions ask the Peninsula Research Project Leader, Jim McCullough, to demonstrate the sampling procedure. Scales must be readable to be useful, so follow proper techniques when sampling.

Important Points to Remember

Gum Cards

A scale card is a gum-backed sheet numbered 1 through 40. Samples are placed on the cards with no attempt to separate the fish by their sex.

It is important to keep the gum card dry at all times. If weather does not allow you to do this it is best to suspend sampling until dryer conditions prevail. A wet gum card is useless as the scales will shift and come off and prevent a readable impression from being taken.

A new scale card is started for each day. Even if a card is not filled a new card is still to be started for each day. Also, a different card is to be used for each location, i.e. Nelson Lagoon vs. Herendeen Bay. It is important that scale cards and numbers match the corresponding AWL sheet.

Scales

1. Clean the scale by wetting it and rubbing it between your fingers. Make sure no dirt, slime and skin (no silver color) remain on the scale.
2. Mount the scale on the gum card with the ridged side up. The ridged side is the same side that is exposed on the salmon.
3. One scale will be taken from sockeye and chum. Two scales will be taken for coho, and three scales for king salmon.
4. Take the preferred scale if it is available, if not available take a scale but note it is not preferred.
5. Scales should be neat, clean, and orderly.

Age-Weight-Length (AWL) Sampling Form

Age - Scale samples are taken for age.

Weight - Taken to nearest tenth of a kilogram on any adult fish not being returned live to the water.

Length - Taken with the fish laying flat from the mid-eye point to the fork of the tail. Measure to the nearest millimeter.

** Fill in all information on the AWL form.

** Each AWL form should match up with the appropriate scale card.

APPENDIX E

Completion of Mark-Sense A.W.L. Forms

Length, Sex, and Scale Sampling Procedure for Sampling:
Using Mark-Sense Forms
(Recommended by Statewide Stock Biology Group, May 1985)

INTRODUCTION

Salmon from the catch are sampled for length, sex, and scales annually by field crews throughout the state. This data base is essential to sound management of the State's salmon resources. This information is drawn upon by management and research biologists for: (1) forecasting run strengths; (2) setting escapement goals; (3) examining the productivity of each system; (4) salmon growth analysis; (5) catch apportionment (based on age composition and/or scale pattern analysis); (6) in-season run estimation; and (7) to gain a better understanding of the biology of each stock.

For clarification purposes a SCALE SAMPLE and SUB-SAMPLE will be defined as follows:

SCALE SAMPLE: A data set collected from a specific sampling location, containing scales and data from a single species, collected during a single year. All data forms and scale cards of a single SAMPLE have the same statistical code. AWL and scale card number in a sample are consecutively and chronologically ordered.

SUB-SAMPLE: Any portion of a scale sample consisting of consecutively numbered AWL's and scale cards. SUB-SAMPLES usually consist of one or more time segments of a sample.

To be useful, data must be recorded on the mark-sense forms neatly and accurately. The following procedures are to be adhered to when sampling for length, sex, and scales using mark-sense AWL forms.

COMPLETING THE FORMS:

A completed mark-sense AWL form and accompanying gum card for sampling commercial catches of sockeye and chum salmon are shown in Appendix E.1. A completed AWL form and accompanying gum cards for sampling commercial catches of chinook and coho salmon is shown in Appendix E.2.

Complete each section of the left side of the mark-sense form using a soft No. 2 pencil and darken the corresponding blocks as shown in the figures. Make every effort to darken the entire block as partially filled blocks are often missed by the optical scanner which reads and records the data from the mark-sense AWL forms. Label only one form at a time to avoid "the carbon paper effect" and resulting stray marks.

Description:

For catch sampling: Area/Samplers (name and W-R-P)

Gum Card:

The AWL forms and corresponding gum card(s) are numbered sequentially by date throughout the season starting with 001. A separate numbering sequence will be used for each species, gear type, district, and geographic

location. Consult your port supervisor for the current card number. Sockeye and chum samples will have only 1 card per AWL form as shown in Appendix E.1. Coho and chinook samples will contain up to four cards per AWL form as shown in Appendix E.2.

Species:

Refer to the reverse side of the AWL form for the correct digit.

Day, Month, Year:

Use appropriate digits for the date the fish are caught.

District:

List only one district. Consult project leader for appropriate district and subdistrict numbers.

Subdistrict:

List a single subdistrict if it is known and all the fish sampled were from that single subdistrict. Leave blank if more than one subdistrict is involved or if the subdistrict is unknown.

Stream:

Leave blank for catch sampling.

Location:

For catch sampling list the appropriate port code (Appendix E.3).

Period:

List the statistical week in which the fish were caught (Appendix E.4).

Project:

Refer to the reverse side of the AWL form for the correct code.

Gear:

Refer to the reverse side of the AWL form.

Mesh:

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement:

Use (2) mid-eye to fork-of-tail (unless specifically instructed to do otherwise). Refer to Figure E.5.

of cards:

Mark 1 when sampling sockeye and chum salmon (Appendix E.1). Mark 1A, 1B, 1C, or 1D when sampling chinook and coho salmon and write the card numbers perpendicular to the left of the fish # column as shown in Appendix E.2.

It is paramount to keep the mark-sense forms flat, dry, and clean. Fish gurry and water curling will cause data to be misinterpreted by the optical scanning reader machine. In general, keep the forms neat enough and legible enough to have a stranger be able to make sense out of them.

Additional data columns are available on the reverse of the AWL for individual project use. If you as a project leader use them and wish that

data to be read by the opscan reader, you will need to transfer the litho code from the front of the form to the reverse.

GUM CARD(S):

Fill out the gum cards as shown in Appendices E.1 and E.2.

Species:

Write out completely (i.e., chinook, sockeye, etc.).

Locality:

For catch sampling write down area in which fish were caught followed by the word catch (e.e., Herendeen Bay Catch).

Stat. code and Sampling date:

Transfer the appropriate digits from the AWL form.

Gear:

Write out completely.

Collector(s):

Record the last name or initials of the person(s) sampling.

Remarks:

Record any pertinent information such as; number of scales per fish sampled, vessel/tender name, etc. Transfer this same information to the top margin of the AWL.

SAMPLING:

A. GENERAL

1. Sex the fish and darken M or F in the sex columns. If any difficulty was encountered in this procedure, write "I had trouble sexing these fish" on the top margin of the AWL and ask your supervisor for help as soon as possible before sexing additional fish.
2. Measure all species' length in millimeters from the middle of the eye to the fork of the tail, refer to Appendix E.3. Record length by blackening the appropriate column blocks on the AWL form. Column 3 on the AWL form is used for fish over 999 millimeters long (Big Daddy Chinook). Measure all species of salmon to the nearest mm. Check the calipers daily, before use, to ensure the accuracy of the measurements.
3. Pluck the "preferred scale" from the fish using forceps. Remove all slime, grit, and skin from the scale by moistening and rubbing between fingers. The "preferred scale" is located on the left side of the fish, two rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, refer to Appendix E.6. If the "preferred scale" is missing, select a scale within the preferred area on either the left or right side of the fish. If no scales are present in the

"preferred area" on both sides of the fish, sample a scale as close to the preferred area as possible and darken the 8 under "age error code" on the AWL form.

4. Clean, moisten and mount scale on gum card directly over number 1 as shown in Appendix E.6. The side of the scale facing up on the gum card is the same as the side facing up when it was adhered to the fish. This outward facing side is referred to as the "sculptured" side of the scale. The ridges on this sculpture side can be felt with a fingernail or forceps. Mount scale with anterior end oriented toward top of gum card.
5. When sampling sockeye and chum salmon repeat steps 1 through 4 for up to 40 fish on each AWL form.
6. When taking 3 scales per fish as with chinook or 2 scales per fish as with coho salmon sample the "preferred scale" and scale #2 and scale #3 as shown in Appendix E.6. Scale #2 is one inch to the left of the "preferred scale," scale #3 is located one inch to the right, and both are 2 rows above the lateral line. Mount the 3 scales from fish #1 over 1, 11, and 21 on the gum card as shown in Appendix E.2. Continuing, mount the 3 scales from fish #2 over 2, 12, and 22, etc.
7. Use plastic scale card holders to hold individual scale cards during sampling and cover the completed gum card with wax paper for storage.
8. When sampling a weired system you may use the old AWL forms to record the data. Keep the mark-sense forms in camp where they will be clean, dry, and flat. After sampling is done for the day-transfer the data to the mark-sense forms. It is the responsibility of the data collector to transcribe the data before turning it over to the port supervisor.
9. Miscellaneous:
 - a. When scales are sampled in wet conditions it is difficult to mount scales in a fashion so as to result in a good scale impression being made. Glue often obscures scale features and scales frequently adhere poorly to the card. In this situation the scales should be remounted.
 - b. For adipose clipped fish record the head tag number on the corresponding row in the first five columns on the reverse side of the AWL.
 - c. Look down the form from two angles after the data has been recorded to pick up any glaring mistakes. A common error occurs, for instance, in placing both the 4 and 7 of a 475 mm fish in the 100's column with nothing in the 10's column.
 - d. Keep all fish gurry off forms and erase any stray marks on the forms before turning them in to your supervisor.

- e. Write in all comments explicitly and completely under remarks, transfer remarks to top margin of AWL.
 - f. Responsibility for accuracy lies first with the primary data collector(s). The port supervisor will return sloppy or incomplete data to individual collectors. After editing a form, place your initials next to card #, but not in left margin.
10. As soon as possible after completion send the samples and mark-sense forms to the ARB in Port Moller. During scheduled radio calls before and following the sending of data to the ARB, the crew leader will notify the ARB: (1) that the data is being mailed (use a moisture-proof container); (2) what data is being sent; (3) when delivery is expected in Port Moller; and (4) who is transporting the data. It is important that these steps are followed to ensure delivery.

B. SAMPLING SCENARIOS:

1. Differing size crews:

- a. One person: Wrestle the fish into the measuring board, wearing a glove on one hand. Measure the fish and write the sex and length down on the measuring board to be transferred to the AWL after ten fish have been measured. Next, pluck the preferred scale(s), clean, and mount on the gum card which is taped to the AWL in the clipboard which is sitting on the end of the measuring board. After 10 fish have been processed, remove the glove and record the sexes and lengths on the AWL with your clean hand. A slime rag may be helpful.
- b. Two persons:
 - (1) When sampling more than one scale per fish, one person can wrestle the fish and record data while the other plucks and mounts scales. The wrestler needs to wear a glove that he can slip off his writing hand to record the sex and length data on the AWL form.
 - (2) When sampling one scale per fish, the person plucking the scales also records the data.
- c. Three persons: One person wrestles the fish, one plucks and mounts the scales, and the third records the data.

2. Sampling tote to tote:

- a. When sampling for 3 scales per fish (chinook and coho) use two persons.
- b. When sampling for 1 scale per fish (sockeye and chum) use three persons, if available.

3. Sampling on a table connected to a vat:

- a. Use three people for one scale per fish; one recorder, one wrestler, and one plucker. The wrestler lays out and measures 10 fish at a time. The plucker samples these 10 fish, placing the scales on his fingers in a systematic manner before cleaning and mounting them on the gum card.

SCALE SAMPLING CHECKLIST

Clipboard
Gum Cards
AWL's

Pencils (No.2)
Forceps
Wax paper inserts

Gloves
Measuring board or calipers
Sampling Manual
Plastic scale card holders

Some Reminders

1. For greater efficiency in scale reading and digitizing, mount scales with anterior end toward top of scale card.
2. AWL's should be carefully edited before submitting to ARB. Re-check header information on AWL's; make sure all available information is filled in. Take extra care to use the correct statistical week for the sampling or catch date. Page numbers should not be repeated; a frequent error is to begin a week's sample with the last page number used the week before. This is particularly important if the data regularly is sent to town; it is easy to forget which numbers were used. Crew leaders should take time to ensure that the boxes are being blackened correctly, if the boxes are sloppily marked the optical scanner records the information incorrectly or misses it entirely. Keep marks within each rectangle and completely fill them. After AWL's are edited, place editor's initial next to page number, but not in left margin.
3. Check to make sure error codes are being used correctly, i.e. error code 7 is wrong species, error code 8 is non-preferred. Error code 6 is for the use of the scale reader, it refers to the reabsorption of the scale.
4. Transfer important comments from scale cards to AWL's. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write comments in the top margin (not on the left side) or on the reverse of the AWL. If there is not room on the AWL to completely explain the remarks, use a separate piece of paper.
5. Never put data from different dates on one AWL or one sale card. Even if only one scale is collected that day, begin a new card and AWL for the next day.
6. If weights are taken, they may be noted in the right margin of the AWL during sampling, but be sure to transfer the weights to the appropriate columns on the reverse of the AWL before submitting it to the ARB.
7. The data processing program uses the "litho code" on the AWL. (It is located in the lower left margin of the AWL.) It helps if the AWL's are used in the order of this code. It should not be hard to keep them in order if they are arranged that way before page numbering. Those who sample different areas throughout the season can arrange the litho codes in order before each sample is taken.
8. If AWL's get wrinkled or splotched they should be copied over before submitting to the ARB. The optical scanning computer will misread or reject wrinkled sheets.

Sockeye
DESCRIPTION

AREA: Nelson Lagoon

Simplers: W: Tracy McKinion
P: Joann Mitchell
R: Jim McCullough

Scale readers: Tracy McKinion
ADFG ADULT SALMON AGE-LENGTH
FORM VERSION 2.1

CARD: 083

SPECIES: 2

DAY: catch date 26

MONTH: 6

YEAR: 87

DISTRICT: 313

SUBDISTRICT: 30

STREAM:

LOCATION: Port Moller

PERIOD: 26

PROJECT: 1

GEAR: 1

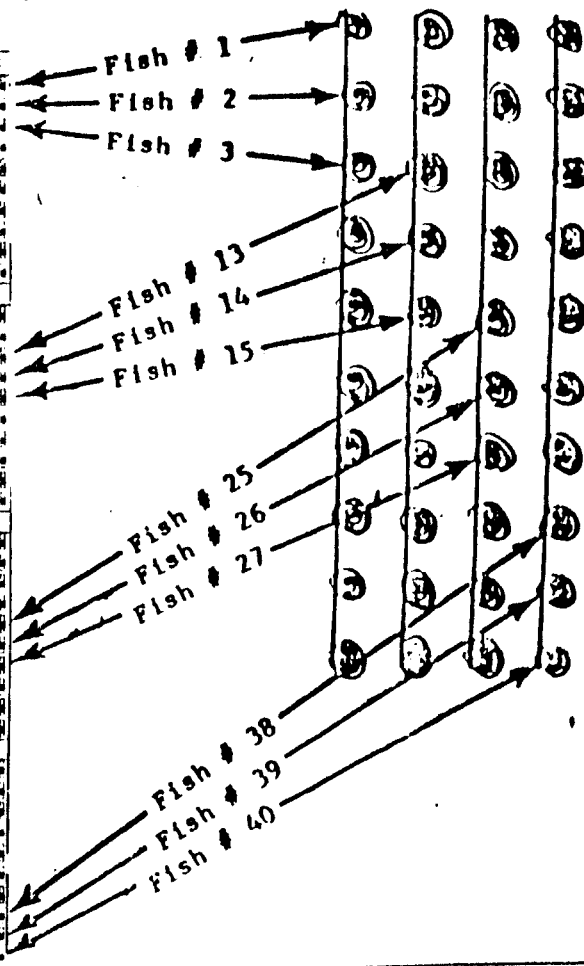
MESH:

TYPE OF LENGTH MEASUREMENT: 2

NUMBER SCALES/FISH: 1

• OF CARDS: 1

100's	1's	AGE GROUP	AGE ERROR CODE
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9
10	10	10	10
11	11	11	11
12	12	12	12
13	13	13	13
14	14	14	14
15	15	15	15
16	16	16	16
17	17	17	17
18	18	18	18
19	19	19	19
20	20	20	20
21	21	21	21
22	22	22	22
23	23	23	23
24	24	24	24
25	25	25	25
26	26	26	26
27	27	27	27
28	28	28	28
29	29	29	29
30	30	30	30
31	31	31	31
32	32	32	32
33	33	33	33
34	34	34	34
35	35	35	35
36	36	36	36
37	37	37	37
38	38	38	38
39	39	39	39
40	40	40	40



Appendix E.1. Example of AWL and gum cards for sampling one scale per fish.

Species: Sockeye Card No: 083
 Locality: Nelson Lagoon Catch
 Stat. Code: 313-30-
 Sampling Date: Mo. 6 Day 26 Year 87
 Gear: Purse Seine
 Collector(s): McCullough, Mitchell, McKinion
 Remarks: _____

Chinook
DESCRIPTION

AREA: Moller to Senaviv

Samplers: W- Tracy McKinion
P- Joann Mitchell
R- Jim McCullough

Scale reader: McKinion

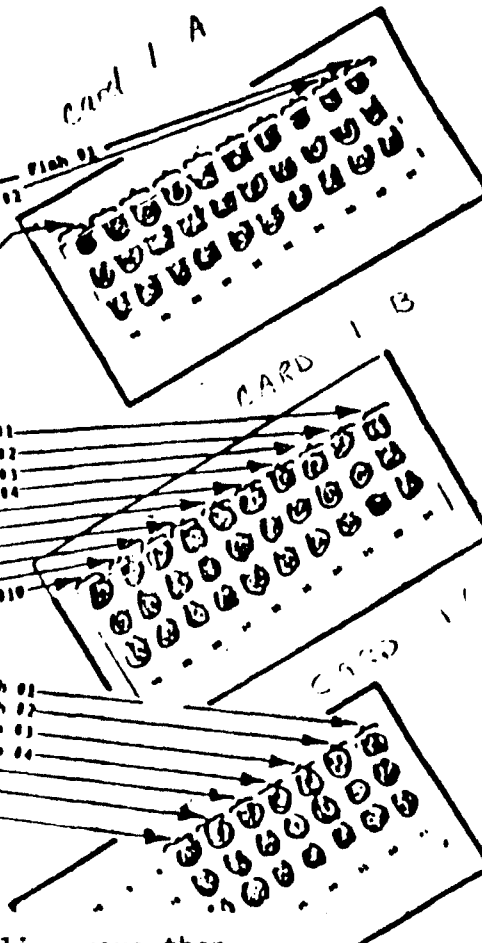
ADFGG ADULT SALMON AGE LENGTH
FORM VERSION 2.1

CARD	100's	10's	1's	AGE GROUP	ADF ERROR CODE
001 A, B, C, Chinook (caught) 20 MONTH 6 YEAR 87 DISTRICT 315 SUBDISTRICT STREAM LOCATION Port Moller PERIOD PROJECT GEAR MESH TYPE OF LENGTH MEASUREMENT NUMBER SCALES FISH OF CARDS					

DO NOT WRITE IN THIS MARGIN

103328

Appendix E.2. Example of AWL and gum cards for sampling more than one scale per fish.



Species: Chinook Card No: 001A
Locality: Moller to Senaviv Catch
Stat. Code: 315
Sampling Date: Mo 20 Day 6 Year 87
Gear: purse seine
Collector(s): McKinion, Mitchell, McCullough
Remarks: 3 scales per fish

Species: Chinook Card No: 001B
Locality: Moller to Senaviv
Stat. Code: 315
Sampling Date: Mo 20 Day 6 Year 87
Gear: purse seine
Collector(s): McKinion, Mitchell, McCullough
Remarks: 3 scales per fish

Species: Chinook Card No: 001C
Locality: Moller to Senaviv Catch
Stat. Code: 315
Sampling Date: Mo 20 Day 6 Year 87
Gear: purse seine
Collector(s): McKinion, Mitchell, McCullough
Remarks: 3 scales per fish

Appendix E.3. Assigned port and weir location codes. (Use under location in filling out AWL's for catch and escapement sampling.)

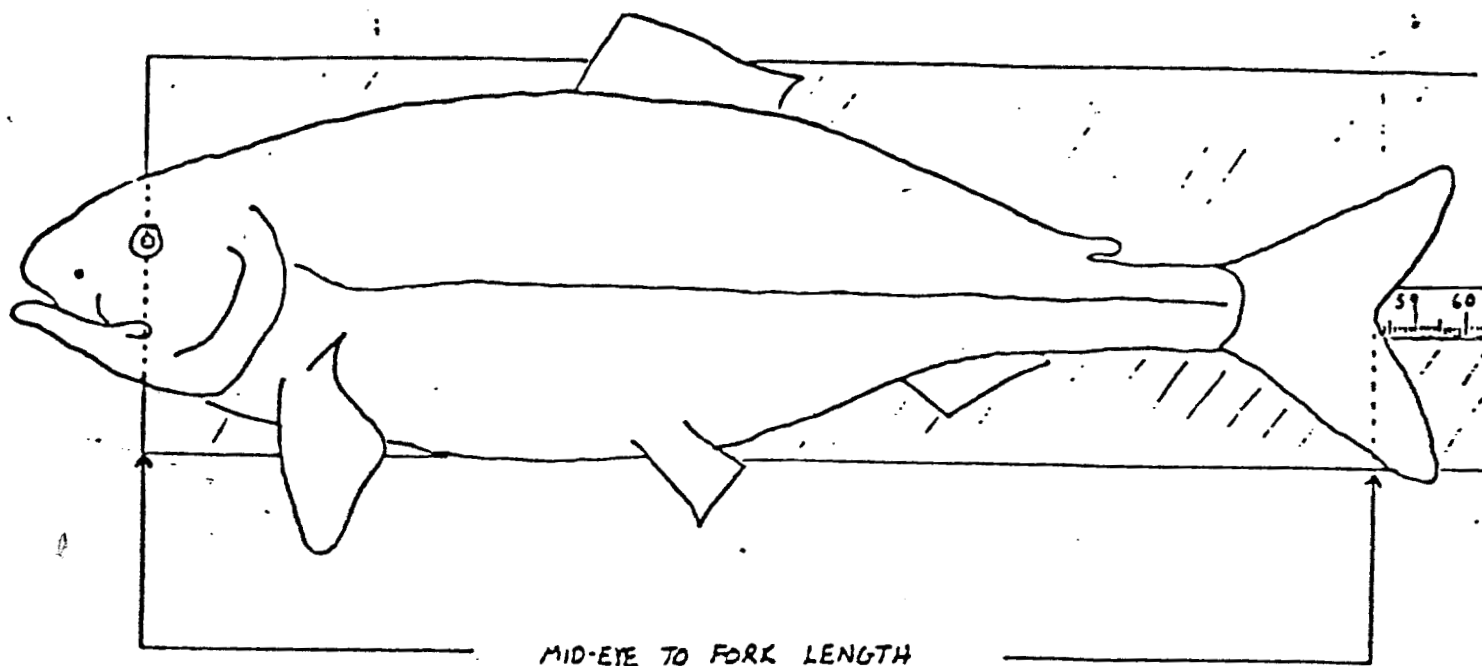
Port Codes

150 - King Cove
151 - Port Moller
152 - Dutch Harbor
153 - Akutan
154 - Sand Point
155 - Bear River, ADF&G Camp
156 - Nelson River, ADF&G Camp
157 - Canoe Bay
158 - Ilnik Lagoon
159 - Sandy Lake
160 - Thin Point Lake
161 - Urilia Bay
162 - Middle Lagoon
163 - Meshik River

Appendix E.4. 1989 statistical weeks.

Statistical Week	Calendar Dates	Statistical Week	Calendar Dates
1	01-Jan to 07-Jan	28	09-Jul to 15-Jul
2	08-Jan to 14-Jan	29	16-Jul to 22-Jul
3	15-Jan to 21-Jan	30	23-Jul to 29-Jul
4	22-Jan to 28-Jan	31	30-Jul to 05-Aug
5	29-Jan to 04-Feb	32	06-Aug to 12-Aug
6	05-Feb to 11-Feb	33	13-Aug to 19-Aug
7	12-Feb to 18-Feb	34	20-Aug to 26-Aug
8	19-Feb to 25-Feb	35	27-Aug to 02-Sep
9	26-Feb to 04-Mar	36	03-Sep to 09-Sep
10	05-Mar to 11-Mar	37	10-Sep to 16-Sep
11	12-Mar to 18-Mar	38	17-Sep to 23-Sep
12	19-Mar to 25-Mar	39	24-Sep to 30-Sep
13	26-Mar to 01-Apr	40	01-Oct to 07-Oct
14	02-Apr to 08-Apr	41	08-Oct to 14-Oct
15	09-Apr to 15-Apr	42	15-Oct to 21-Oct
16	16-Apr to 22-Apr	43	22-Oct to 28-Oct
17	23-Apr to 29-Apr	44	29-Oct to 04-Nov
18	30-Apr to 06-May	45	05-Nov to 11-Nov
19	07-May to 13-May	46	12-Nov to 18-Nov
20	14-May to 20-May	47	19-Nov to 25-Nov
21	21-May to 27-May	48	26-Nov to 02-Dec
22	28-May to 03-Jun	49	03-Dec to 09-Dec
23	04-Jun to 10-Jun	50	10-Dec to 16-Dec
24	11-Jun to 17-Jun	51	17-Dec to 23-Dec
25	18-Jun to 24-Jun	52	24-Dec to 30-Dec
26	25-Jun to 01-Jul	53	31-Dec to 31-Dec
27	02-Jul to 08-Jul		

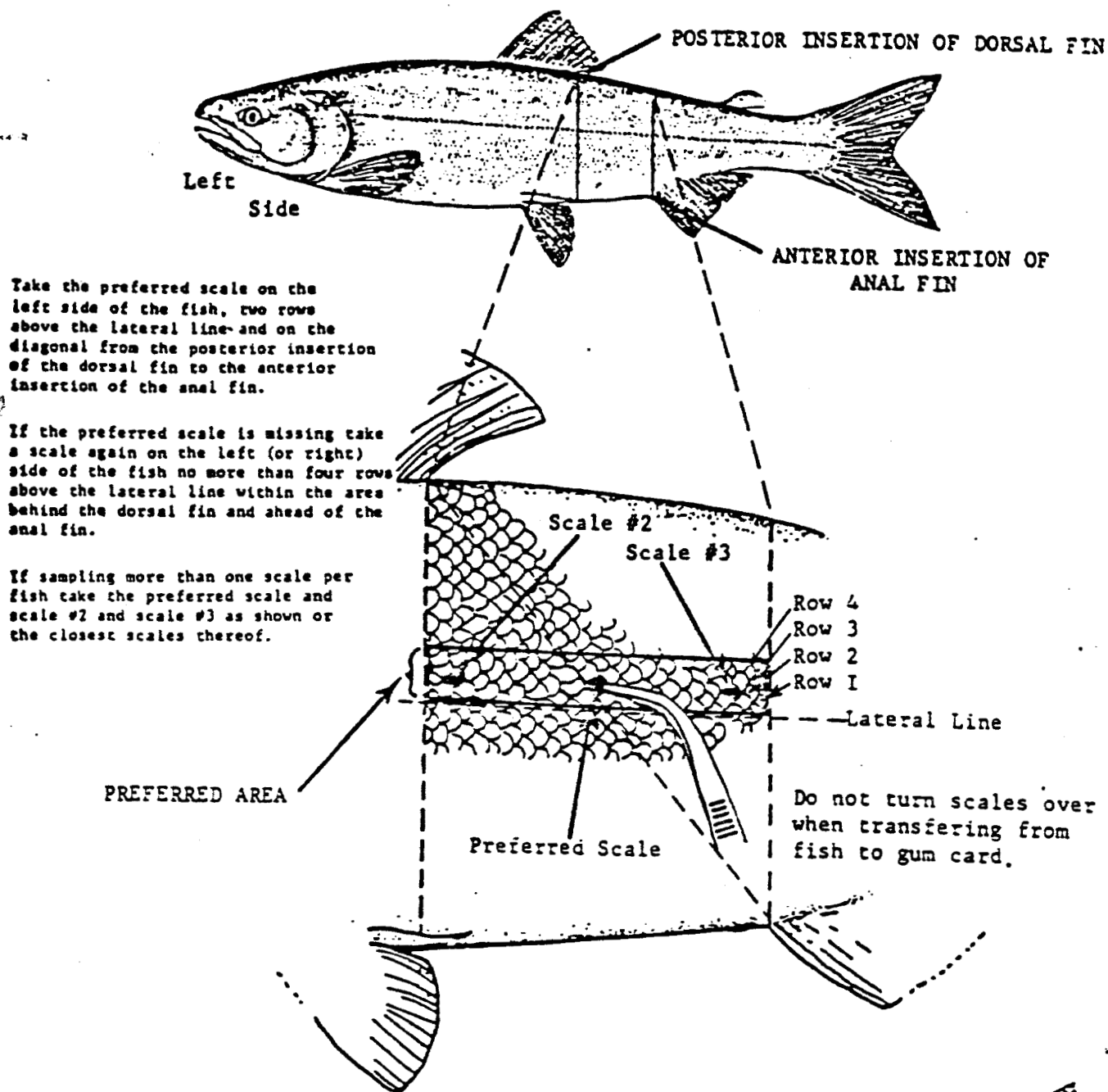
Appendix E.5. Measuring fish length.



Because the length and form of the snout of salmon changes as the fish approaches sexual maturity, length measurements are made from the middle of the eye to the fork of the tail. The length is always recorded to the nearest millimeter. The procedure for measuring length (mid-eye to fork) of the salmon is as follows:

1. Place the salmon flat on the board with the head to your left and the dorsal fin away from you.
2. Make sure your eye is directly over the end of the board. Line the eye of the salmon up with the edge of the board and hold the head in place with your left hand. It helps to place a finger in the salmon's eye for reference.
3. Flatten and spread the tail against the board with your right hand.
4. Read the mid-eye to fork length to the nearest millimeter.

Appendix E.6. Scale sampling procedure showing the preferred scale sampling area on an adult salmon.



NOTE: Mount scales with anterior portion of scale oriented toward top of card.

Place scales directly over number on gum card.

10	9	8	7	6	5	4	3	2
20	19	18	17	16	15	14	13	12
30	29	28	27	26	25	24	23	22
40	39	38	37	36	35	34	33	32

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APPENDIX F

Other Area "M" Management Plans

1989

ALASKA PENINSULA - ALEUTIAN ISLANDS
GENERAL SALMON MANAGEMENT PLAN

By: ARNIE SHAUL AND LEN SCHWARZ

Regional Information Report¹ No. 4K89-8

Alaska Department of Fish and Game
Division of Commercial Fisheries, Westward Region
211 Mission Road
Kodiak, Alaska 99615

April 1989

¹The Regional Information Report Series was established in 1987 to provide an informational access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate needs for up-to-date information, reports in this series may contain preliminary data.

1989
ALASKA PENINSULA-ALEUTIAN ISLANDS
GENERAL SALMON MANAGEMENT PLAN

SOUTH PENINSULA JULY - AUGUST

The 1989 pink salmon projected catch is 3 million fish. This is less than half of the 1988 harvest of 6.8 million fish, but over double the parent year (1987) harvest of 1.2 million. The 1979-88 average South Peninsula post June pink salmon harvest is 5,177,000.

The post June chum salmon harvest is anticipated to be roughly 800,000 fish which will be below the 1988 harvest of 1,379,000 which was the second largest harvest since 1962. The 1979-1988 average catch was 1,044,000 ranging from 378,000 in 1979 to 1,399,000 in 1986.

During 1980 a much larger than normal number of purse seiners caught record numbers of pink salmon in the Shumagin Islands. It became apparent that the purse seine fleet was effectively preventing the salmon from reaching the bays and the runs were only mediocre east of Volcano Bay. Due to the fact that there is often considerable variation in the strength of runs going to different geographical locations, the amount of purse seine gear in the Shumagins will definitely be a factor in determining the amount of fishing time allowed in the Shumagins as compared to mainland terminal harvest areas.

It is speculated that large numbers of Chignik sockeye may be intercepted during July in portions of the Shumagin Islands Section. These locations did not have a history of substantial fishing effort until recently. The locations in question are:

- (1) The west side of Unga Island located between Bay Point and Archedin Point.

- (2) The portion of the Shumagin Islands Section located south of 55° N. lat. (which includes Mountain Point on Nagai Island).

The above locations (and other locations in the Outer Shumagins where it is suspected that large numbers of Chignik destined sockeye are being taken) will be closed to commercial salmon fishing if substantial numbers of sockeye are being caught and the Department determines that the late Chignik run is below escapement needs.

Initially that portion of the South Peninsula located east of Rock Island (near Cape Lazaref) and not covered by the Southeastern District Management Plan (found in 5 AAC 09.360) will be open to commercial salmon fishing for two days from 4:00 A.M. July 6 until 10:00 P.M. July 7. The amount of fishing time allowed after the first fishing period will depend on the strength of catches and escapements.

Local chum runs begin earlier than returns of pink salmon. Consequently openings prior to about July 18 will be based on the strength of the chum salmon run, unless pink catches appear unusually strong prior to this date. After July 18, fishing time will be based largely on pink salmon run strength, although chums are still an important factor.

ALEUTIAN ISLANDS

Due to poor pink salmon escapements in Unalaska Bay (the only location with a history of producing large odd year cycle pink salmon runs) during 1987, it is unlikely that a large harvest of pink salmon will occur in 1989. The projection is for a pink salmon harvest of about 50,000.

The Kashega Bay Section (Spray Cape to Konets Head) only, will be open from 6:00 A.M. Monday to 6:00 P.M. Friday each week from

June 1 through July 9, to allow fishermen the opportunity to fish local sockeye.

The entire Aleutian Islands Area will open to commercial salmon fishing from 6:00 A.M. Monday July 10 until 6:00 P.M. Friday July 14 and from 6:00 A.M. Monday July 17 until 12:00 P.M. midnight Tuesday July 18, as specified in the regulation book. There may be very short fishing periods during July 21-24 to test run strength. If the runs do not indicate substantial strength before July 30, the area will remain closed until escapements justify fishing time. It is possible that spot openings will occur in precisely defined locations as was the case in 1988.

NORTH PENINSULA

The North Peninsula salmon fisheries will be managed on the basis of catch per unit effort indicators, and relative abundance of fish as determined by surveys and weir/tower counts. The basic fishing week, during the open season, will be as listed in the 1988-89 Commercial Finfish Regulation Book and is presented below:

<u>SECTION</u>	<u>OPEN SEASON</u>	<u>FISHING PERIOD</u>
Cinder River, outside Cinder River Lagoon.	August 1 - September 30	6:00 A.M. Monday until 6:00 P.M. Wednesday
Cinder River, inside Cinder River Lagoon	May 1 - September 30	6:00 A.M. Monday until 6:00 P.M. Wednesday
Outer Port Heiden	August 1 - September 30	6:00 A.M. Monday until 6:00 P.M. Wednesday
Inner Port Heiden	May 1 - September 30	6:00 A.M. Monday until 6:00 P.M. Wednesday
Ilnik Section outside Ilnik Lagoon	July 5 - September 30	6:00 A.M. Monday until 6:00 P.M. Wednesday

<u>SECTION</u>	<u>OPEN SEASON</u>	<u>FISHING PERIOD</u>
Ilnik Section inside Ilnik Lagoon	May 1 - September 30	6:00 A.M. Monday until 6:00 P.M. Wednesday
Three Hills	June 25 - September 30	6:00 A.M. Monday until 6:00 P.M. Thursday
Bear River	May 1 - September 30	6:00 A.M. Monday until 6:00 P.M. Thursday
Herendeen-Moller Bay Section, enclosed by a line from Harbor Point to Entrance Point	May 1 - September 30	6:00 A.M. Monday until 6:00 P.M. Thursday
Herendeen-Moller Bay Section, <u>not</u> enclosed by a line from Harbor Point to Entrance Point	May 1 - July 20	6:00 A.M. Monday until 6:00 P.M. Thursday
Nelson Lagoon	May 1 - June 15	6:00 A.M. Monday until 12:00 Midnight Wednesday
Nelson Lagoon	June 16 - August 15	6:00 A.M. Monday until 12:00 Midnight Thursday
Nelson Lagoon	August 16 - September 30	6:00 A.M. Monday until 12:00 Midnight Wednesday
Caribou Flats	<u>Completely closed to commercial salmon fishing.</u>	
Black Hills	May 1 - September 30	6:00 A.M. Monday until 6:00 P.M. Friday
Izembek-Moffet Bay	June 1 - August 10	6:00 A.M. Monday until 6:00 P.M. Thursday
Swanson Lagoon	June 1 - August 10	6:00 A.M. Monday until 6:00 P.M. Thursday
Urilia Bay	June 1 - August 10	6:00 A.M. Monday until 6:00 P.M. Thursday
Dublin Bay	July 10 - August 10	6:00 A.M. Monday until 6:00 P.M. Thursday
Bechevin Bay	June 1 - September 30	<u>By Emergency Order Only</u>

The Bechevin Bay Section will be open concurrently with the Ikatan Bay Section (part of South Peninsula) during June. In

July, the Bechevin Bay Section will initially be open from 6:00 A.M. Monday until 6:00 P.M. Thursday. The extent of further openings will depend on the strength of the stocks.

A catch of approximately 1.9 million sockeye is projected for the entire North Peninsula (Urilia Bay to Cinder River) with the bulk of the catch being harvested in the Bear River and Nelson Lagoon fisheries. This is above the 1988 harvest of 1.5 million sockeye.

The Bear River sockeye escapement goal will be broken into three segments (listed below) to ensure that all stocks contributing to the Bear River run receive adequate escapement. This does not change the season escapement goal of 200-250,000 sockeye.

BEAR RIVER SOCKEYE ESCAPEMENT GOAL

<u>Time Period</u>	<u>Sockeye Escapement Goal</u>
Through July 15	110,000 to 125,000
July 16 - August 5	40,000 to 50,000
After August 5	<u>50,000 to 75,000</u>
Season Total	200,000 to 250,000

The number of jack sockeye in the escapement is an important consideration. If the number of jacks is excessively high, it may be necessary to raise the escapement goal to compensate.

The 1989 chum harvest is anticipated to be 500,000, slightly over the 1979-1988 North Peninsula average of 465,000 chums.

NELSON LAGOON FISHERY

The sockeye salmon escapement goals in the Sapsuk River system (Nelson Lagoon) is established at 100,000 - 150,000. Based on timing of sockeye escapements for the years 1977-1982 and aiming at the average escapement goal of 125,000 sockeye a schedule of periodic in-season escapement goals past Sapsuk tower will be utilized during the 1989 season.

Because escapements past the tower lag a significant period of time following passage through the fishery, total daily catches of sockeye in the fishery will also be considered in evaluating run strength. The following schedule of periodic daily sockeye catch levels will be used as a guideline.

SAPSUK TOWER SOCKEYE SALMON ESCAPEMENT SCHEDULE

6-25	6-30	7-5	7-10	7-15	7-20	7-25	7-30	8-5	8-10	8-15
*0	30	65	90	110	115	120	122	123	124	125

NELSON LAGOON SOCKEYE CATCH SCHEDULE

6/15-20	20-35	23-30	7/1-5	5-10	10-15	15-20	20-25
**1-2	2-3	4-5	4-6	3-5	2-3	1-2	1-2

* Thousands of sockeye salmon (accumulative)

**Thousands of sockeye salmon (daily catch)

To provide more protection for king salmon stocks, fishing periods through June 15 are limited to 6:00 A.M. Monday until 12:00 P.M. midnight Wednesday.

There will be four days fishing each week through June 30, additional time will be added if daily sockeye catches substantially exceed the schedule. However, if it is evident before June 30, that the sockeye run is weak then the number of fishing days will be reduced. Any predominance of king salmon gear in the fishery will be taken into account in evaluating sockeye catches. After June 30, fishing periods will be dependent upon escapement in relation to the escapement schedule and on daily catch levels. If escapements past Sapsuk tower (a weir is being constructed to replace the tower) cannot be determined then (primarily) daily catch rates and (secondarily) daily catch per boat (not per landing) will be utilized to evaluate strength of the run and to establish fishing periods accordingly. During the peak of the fishery, approximately June 25 - July 5, a healthy sockeye run would provide consistent daily boat averages of at least 300 - 400 sockeye. Probable effect of minus tides on escapement will also be considered. The strength of the king

salmon run will be a major factor during June and will be considered in decisions regarding sockeye.

It is not anticipated that more than three days per week will be allowed during the fall coho season in Nelson Lagoon. The efficiency of the gear in the fishery has caused a closure of the entire Nelson Lagoon Section in early September during 1985, 1986, and 1987 (when the fishery was open four days per week).

FALL FISHERIES (for Locations Outside of Nelson Lagoon)

Fall fisheries (principally for cohos) on the South Peninsula and in the Northwestern District will open approximately September 1-5 provided there will be no conflict with attaining escapement goals for earlier runs (primarily chums). Fishing periods will be set by emergency order.

Northern District coho runs will get underway during mid August. Fishing periods will initially be the same as listed in the 1988 Commercial Finfish Regulation book for each respective section. Adjustments will be made as the runs develop.

APPENDIX G
General Equipment, Camp Maintenance
and Camp Policy

GENERAL EQUIPMENT AND CAMP MAINTENANCE, AND CAMP POLICY

Camp Maintenance

Maintaining a clean and efficient camp site is required. A few of the things to check are:

1. Maintenance of living accommodations and other installations will be performed as necessary. All materials necessary will be provided.
2. Grounds will be kept free of litter. All garbage will be bagged up and at a minimum disposed of at the nearest sanitary landfill once a week. Special precautions should be observed to ensure that garbage does not attract bears and other scavenger species.
3. Upon completion of the summer season, all camp equipment will be cleaned preparatory to winter storage.
4. All sampling nets, tents, and tarps must be dry before being stored.
5. A complete camp inventory will be taken by the crew leader at the close of the field season.

Camp Policy

1. No alcoholic beverages are to be stored in areas open to public view including cook tents. If alcohol is consumed at a camp an employee must be off-duty and under no circumstances shall he or she engage in the operation of any State equipment, including boats and motors nor shall he or she return to duty status under the influence of alcohol.
2. The crew leader of each sampling station shall establish a policy on living standards and personnel behavior in accordance with normal guidelines.
3. All sampling stations will operate as directed. No crew leader shall be off location for more than 24 hours unless specifically authorized by the ARB. Time-off for individual crew members shall be scheduled by the crew leader and it shall be his option as to whether sampling duties allow time-off from the location.
4. All employees will be required to act in a professional manner at all times and shall be especially courteous to the public.
5. It will be the responsibility of the crew leader to report any equipment abuse to the ARB and to ensure that abuse does not occur.

Additionally, the crew leader must also report within 24 hours to the above cited authority, any line 500 equipment loss which occurs.

Equipment Maintenance

Equipment maintenance is perhaps one of the most important operations you will perform during the field season. The outboard motors and generators must be kept in good operating condition or the whole program will suffer.

It will be the crew leader's responsibility to assign the most knowledgeable member of the crew to the job of maintaining and servicing the equipment. It will be this persons responsibility to see that all equipment is kept in operating condition.

Outboard Motors

Your outboard motor will perform longer and give less trouble if these suggestions are followed:

1. The correct outboard fuel mixture is 50:1. Always pour the oil into the tank first, then add 2 to 3 gallons of gas and mix thoroughly, then fill tank to capacity always using a large funnel and chamois filter.
2. Chain saws have a fuel mixture 25:1. Chain saw gas should be mixed in a 5 gallon can and clearly marked that it is chain saw fuel.
3. When mixing gasoline or filling the tanks of the generator, stove or lantern, keep the following in mind:
 - a. Always mix fuel tanks or equipment under cover to prevent water contamination. Always use a funnel and filter.
 - b. Fill camp stoves and lanterns outside as the danger of fire is very real.
 - c. A little extra effort toward cleanliness will pay in hours of trouble free operation.
4. Always place outboard in neutral when starting.
5. Check daily the clamp screws that hold the outboard to the transom. Also routinely check the motor for loose screws and bolts, cracks, and breaks, especially in the area of the lower unit.
6. Never start or run an outboard in the tilted position.
7. In the normal operation of a water pump, a "tell-tale" stream of water is discharged from a hole in the bottom edge of the cowling or from the back of the shaft. If this stream of water stops, the water pump is not working and the motor should be shut off. The side plate over the water intake can be removed for temporary relief as it may be plugged. If the pump continues not to function, the outboard should not be run, and a report to base camp should be made.
8. Check the grease in the lower unit of prop outboards once a week, and drain and replace grease every three weeks. Jet units must be

greased daily. This is crucial. Special grease guns will be provided.

9. If the skeg or jet unit hits bottom, check the screws for tightness and housing damage.
10. If your outboard will not start, check the following:
 - a. Check to see if the fuel line is connected to the motor and the tank and not pinched or kinked.
 - b. Check to see if there is water in the gasoline.
 - c. Check to see that the engine is not flooded.
 - d. Check the spark plugs as they may be fouled or defective (replace if needed).
11. All outboards are to be tilted in the up position when moored at mainstem stations to preclude silt accumulation in the jet unit or water pump and skeg or housing damage.

Lastly, it should be emphasized that the salmon enumeration counts and sampling must continue, as they are very important to the program.

Boats

1. Boats are to be kept clean and free of loose tools and debris, and moored at locations where they are not subject to damage by wave action or through contact with the river bottom in rock laden areas.
2. Each crew leader will be responsible for maintaining mooring stakes on the river bank sufficient for the boats assigned to his subproject plus one transient craft. Further responsibility includes maintaining a skookum bow line on each assigned craft and ensuring that each boat is properly moored at the end of each work day to preclude possible loss or damage.

Generators

Portable generators may be supplied to field camps. Their maintenance follows the same line as for the outboards. Since some of the generators have 4-cycle engines, mixed gas must not be used. The crankcase oil reservoir should be checked daily and maintained at the full level. After 25 hours of operation the oil should be changed. Spark plugs should be checked after every five (5) hours of operation.

Food Orders

Grocery orders should be placed with the Sand Point or Cold Bay office during the evening radio schedule.

Personal Gear and Pets

Generally 100 lbs. is a maximum for personal gear. If you anticipate bringing more than that amount to your field camp, check with your supervisor first. Pets, (especially dogs) should not be brought to our field camps. Past experience indicates, that one or more of the following problems usually occur:

1. Problem of transportation in small planes for some pets.
2. Who is going to pay for the pet food and who is going to purchase it in town?
3. Some pets attract bears, etc. Dogs will chase a bear until the bear gets mad and then when the bear goes for the dog, the dog will run to his owner or the cabin.
4. Your pet may not be compatible with the other members of your camp and may interfere with work.
5. A pet that gets sick or injured can cause you considerable expense if it must be brought back to town.

Compatibility of Field Personnel

If you find yourself unable to get along with other members at your camp, notify the ARB and we will attempt to solve the problem. Usually, the person with the most experience in camp will be the crew leader. If it is not clear who has been designated crew leader in your camp ask your supervisor.

APPENDIX H
First Aid and Safety

M E M O R A N D U M

S T A T E O F A L A S K A

To: ALL CREW LEADER

1989 FIELD SEASON

**From: Jim McCullough
 Peninsula Finfish Research Biologist
 Division of Commercial Fisheries
 Department of Fish & Game - Kodiak**

SUBJECT: Health and Welfare of Crew Members

It is your responsibility to ensure that your crew members are fully aware of health and safety practices (e.g. boiling water to prevent dysentery and kill giardia, what to do in an emergency, where first aid kits and fire extinguishers etc. are located, washing hands before preparing meals, etc). More often than not, these obvious practices are ignored. With camps as they are, neglect of health practices can have serious ramifications if several employees were to become ill at the same time.

King Cove and Port Moller have medical clinics. Insurance forms will be available at both locations. Inform the ARB immediately of any illness or injury that will require medical assistance or lost work time.

Firearms

A State rifle will be provided at each camp. You may bring your own firearm if you wish. Loaded guns are prohibited inside the camp facilities. Loaded, meaning a round in the chamber of the gun. Anyone handling a firearm should always treat it as if it were loaded. Guns should be kept clean and oiled and be completely unloaded while being cleaned. Any horseplay with or misuse of firearms while working for the Department of Fish and Game will not be tolerated and will be grounds for immediate dismissal. Completely unload a firearm of all rounds before entering a vessel or airplane. Keep an empty chamber under the firing pin of each pistol.

Bears

Do not antagonize them - each one is a potential danger. Do not encourage bears to come around camp by leaving food or unburned garbage around.

Do not shoot at a bear unless, in your best judgement, he is endangering someone's life.

When, and if, trying to frighten a bear away by shooting - do not fire toward it. By chance, you may wound it by pulling the shot, ricochets, etc.

If you are having problems with a particular bear around camp, call the office and notify them of the situation. The Game Division personnel will take care of the problem, if it is feasible.

Garbage

Burn all garbage to prevent bear problems. Cut out both ends of tin cans and squash them flat, and box them for empty return flights. Garbage pits are prohibited by the Fish and Wildlife Service on the refuge. Never start fires with fuel. Be sure all burn barrels have proper grates or covers to prevent grass fires from sparks.

Boating and ATV's

We do not expect you to endanger life or property by going out in a boat on dangerously rough water. Wear your life jackets when out on open water. Use your head - if you think it is dangerously rough, don't go out on the water.

Extra shear pins or propellers and a tool kit which includes pliers, spark plugs, and a spark plug wrench should be in the boat at all times. In case travel at night becomes necessary, carry a flashlight.

Some camps may be furnished with 3-wheel or 4-wheel all terrain vehicles (ATV's). The following safety precautions shall be observed at all times regarding Department ATV's. Only employees of the State may use the vehicles. Only one employee may ride on the vehicle at one time. The safety helmet provided must always be worn during operation of an ATV. An ATV may provide transport of State materials, supplies, and equipment between camp sites and supply planes or vessels. In addition, they may be used for transportation to and from assigned duties in the field such as monitoring a fishery or collecting harvest information, etc.

Fire and First Aid Safety

Check your camp's fire extinguisher. Know where it is and how to use it! Inventory your camp first aid kit, replace items as needed and become familiar with basic first aid treatment. Review the first aid booklet.

Drinking Water

Take pains to avoid intestinal parasites carried by beaver and otter etc. When in doubt, boil your drinking water.

Cleanliness Of Cabin, Etc.

Keep the cabin, surrounding area, and yourself clean and neat. Appearance is important. You will not always be notified of the intended arrival of visitors, officials, etc. Impressions of visitors are often based on appearance.

APPENDIX I
Secchi Disk Recording

MEMORANDUM

State of Alaska

To: Field Crews

DATE: April 24, 1989

From: Jim McCullough
Peninsula Finfish Research-Project Leader
Division of Commercial Fisheries
Westward Region
Kodiak

Subject: Secchi Disk Recording

ADF&G is in the process reevaluating optimum sockeye escapement requirements and rearing potentials of many systems. We intend to evaluate our systems using multiple approaches. One method is by determining the euphotic volume (zone in which 1% or more of the photosynthetically active radiation penetrates). Secchi disk readings, a bathymetric map, and a calculated surface acreage are basically all that is needed to estimate available rearing habitat by euphotic volume.

In the Alaska Peninsula we will take secchi disk readings at the following lakes:

1. Bear Lake: number of stations 5
2. Sandy Lake: number of stations at least 2

We have bathymetric maps for Sandy and Bear Lakes so echo sounding of these lakes will not be required.

Secchi Disk

The original Secchi Disk was a white circular plastic plate, 20 cm in diameter that is used to determine the turbidity or degree of visibility in natural waters. The Secchi Disk provides a very simple means of making transparency determinations in natural waters. A measured line is attached to the center of the disk by means of a special fitting that stabilizes the disk so that it will be parallel to the surface. The disk is lowered into the water until it just disappears from sight. The disk is raised and lowered and readings are taken from the calibrated line at the point where it disappears and reappears. The average of the two readings is recorded as the Secchi Disk Transparency (SD). Best results are obtained in the lee and/or shaded side of a boat or dock. The best readings are usually obtained after early morning and before late afternoon.

Transparency usually decreases in the summer when plankton, silt and organic matter are more likely to be prevalent. The most transparent lakes are usually seepage lakes as this characteristic greatly reduces the amount of silt bearing influents. Drainage lakes carry more silt and usually are less transparent. For example, a drainage lake may be in a class of 1.0 to 1.4 m but a seepage lake in the same area may give readings of 3.0 to 4.0 m. A high reading in the class of 19 to 21 m would indicate extreme clarity; however, that same lake in the summer may read 10 m.

The Secchi Disk (SD) is often used to estimate the euphotic zone depth (EZD) or light compensation point within lakes.

File:sechform.nwp

EXAMPLE

Location: Bear Lake

Secchi Disk Recording Form

Year	Sample Site					Remarks
1989						
Date	1	2	3	4	5	
10-10	22.2	22.2	12.5	20.2	19.3	Scattered clouds, SE 10, visability unlimited, 1' chop, 2:30 - 4:30 pm, surface temperature 11 degrees C.

APPENDIX J
Water Samples

MEMORANDUM

State of Alaska

To: Field Crews

DATE: April 24, 1989

From: Jim McCullough
Peninsula Finfish Research-Project Leader
Division of Commercial Fisheries
Westward Region
Kodiak

Subject: Water Samples

ADF&G is in the process of reevaluating optimum sockeye escapement requirements and rearing potentials of many systems. We want to start evaluating systems using multiple approaches. One method is by determining the primary productivity of a lake.

In the Alaska Peninsula we will take water samples at the following lakes:

1. Bear Lake: number of stations 1
2. Sandy Lake: number of stations 1

Samples are collected using a Van Doren water collector from a depth of one meter and a depth of about 100 feet. Samples from each depth should be two liters. Store in a dark container and in ice (temperature should be less than or equal to 4 degrees Celcius). Samples must be delivered to Clayton Brown in Cold Bay within 24 hours, so record the date, time, and water depth of the sample, if the arrival of the samples are delayed you will be notified so that additional samples can be collected. Collect a sample on about 1 June, 1 July, and 1 August for Bear Lake and when it is possible for Sandy Lake.

FIELD MANUAL
1989 SALMON WEIRS AND ESCAPEMENT SAMPLING
FOR THE ALASKA PENINSULA

by

James N. McCullough
Area Research Biologist

Alaska Department of Fish and Game
Division of Commercial Fisheries
211 Mission Road
Kodiak, Alaska 99615

May 1989

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INTRODUCTION

The basic function of fisheries management is to allow effort on stocks with a harvestable surplus while protecting those with returning runs below escapement requirements.

In 1989 weirs at Bear and Nelson Rivers (Figures 1-4) will enumerate and sample the escapement. Field camps at Urilia Bay, Middle Lagoon, and Thin Point Lake (Figure 5) will estimate the escapement and sample fish from the commercial or subsistence catch.

OBJECTIVES

Long Term: Better management of the salmon resources for the Alaska Peninsula Management Area through improved forecasting, development of stock-recruitment relationships to assess escapement requirements, and accurate assessment of stock composition.

Short Term:

1. Determine salmon escapement by species.
2. Determine the sockeye and chum age, length, and sex composition for the major systems within standard levels of precision.
3. Determine the age, length, and weight composition of sockeye smolt for the major systems within standard levels of precision.

SUPERVISION

The Area Management Biologist (AMB), Arnie Shaul, will directly supervise the Urilia Bay, Middle Lagoon, and Thin Point projects. The Assistant Area Biologist (AAR), Len Schwarz, will directly supervise the Nelson River crew. The Area Research Biologist (ARB), Jim McCullough will directly supervise the Bear River crew. The exception is that the Area Research Biologist (ARB) at Port Moller, Jim McCullough, will train the sampling crews on the proper techniques and procedures, and visit both the Nelson and Bear River camps, to insure sampling is being conducted properly.

PERSONNEL

ADF&G will staff Bear River from about 24 May through 1 September and Nelson River from about 15 May through 31 July. A weir is operated at Bear River and a counting tower at Nelson River. The personnel assigned to these projects are responsible for counting the adult return and sampling

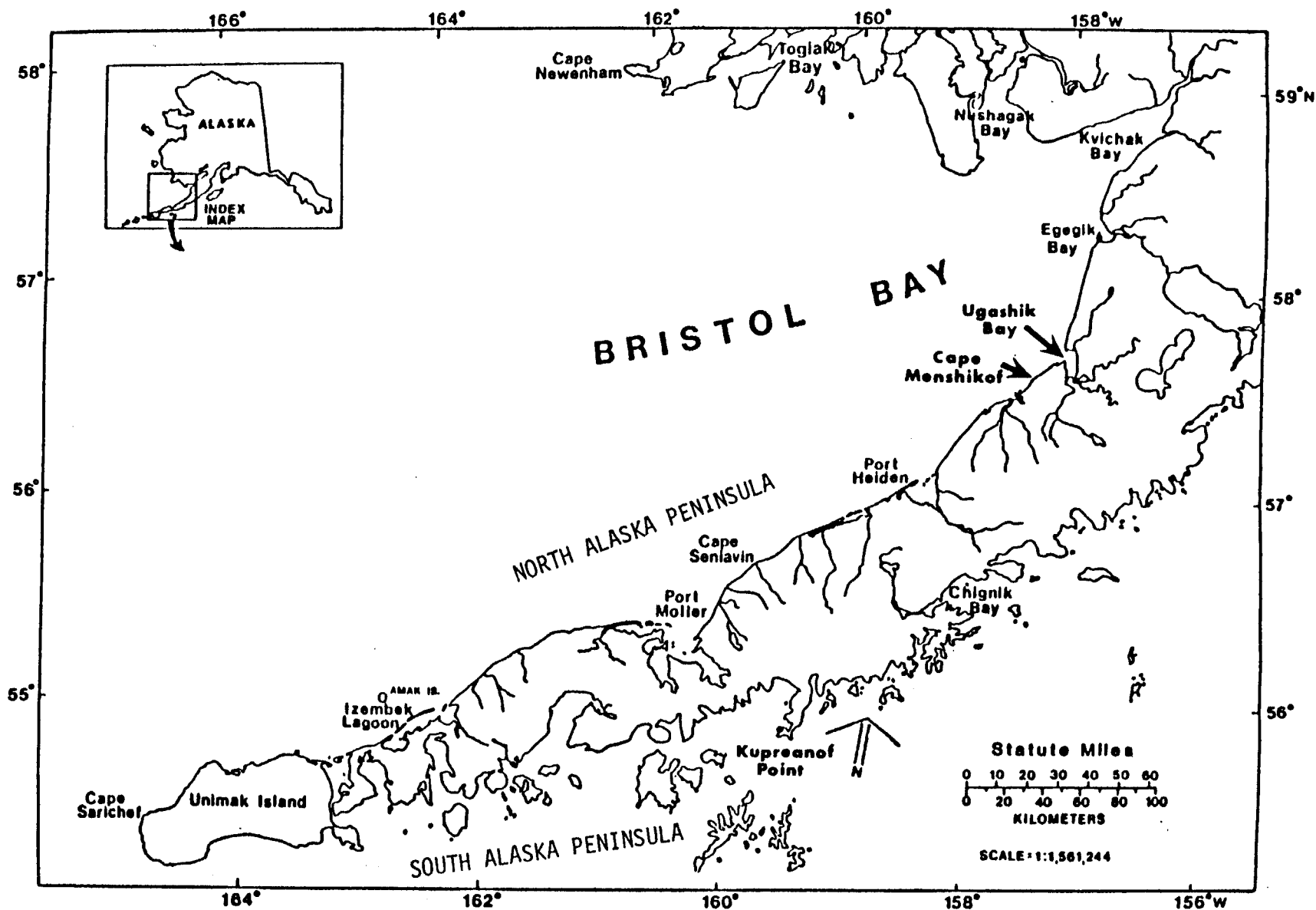


Figure 1. Map of the Alaska Peninsula from Kvichak Bay to Unimak Island.

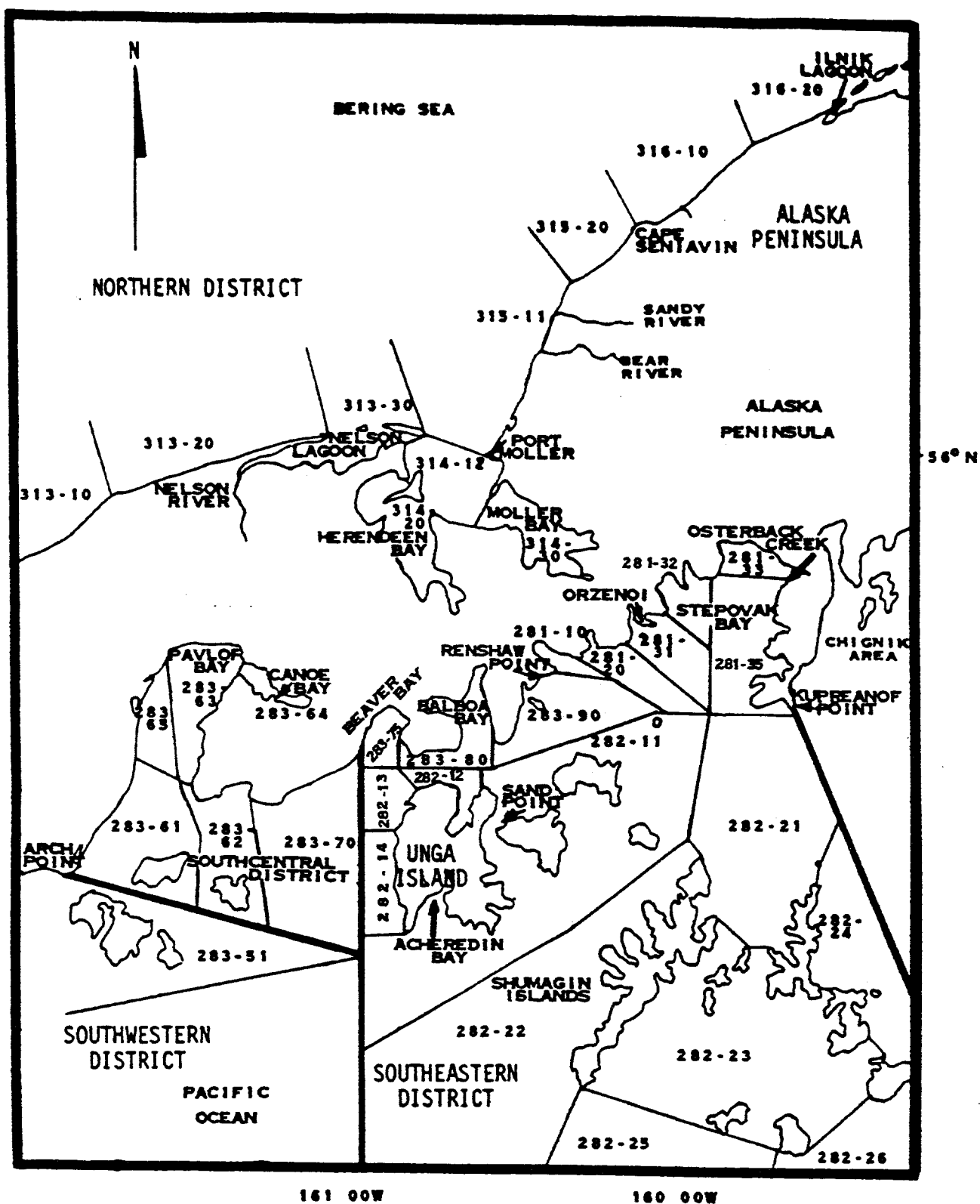


Figure 2. Map of the Alaska Peninsula from Arch Point to Kupreanof Point.

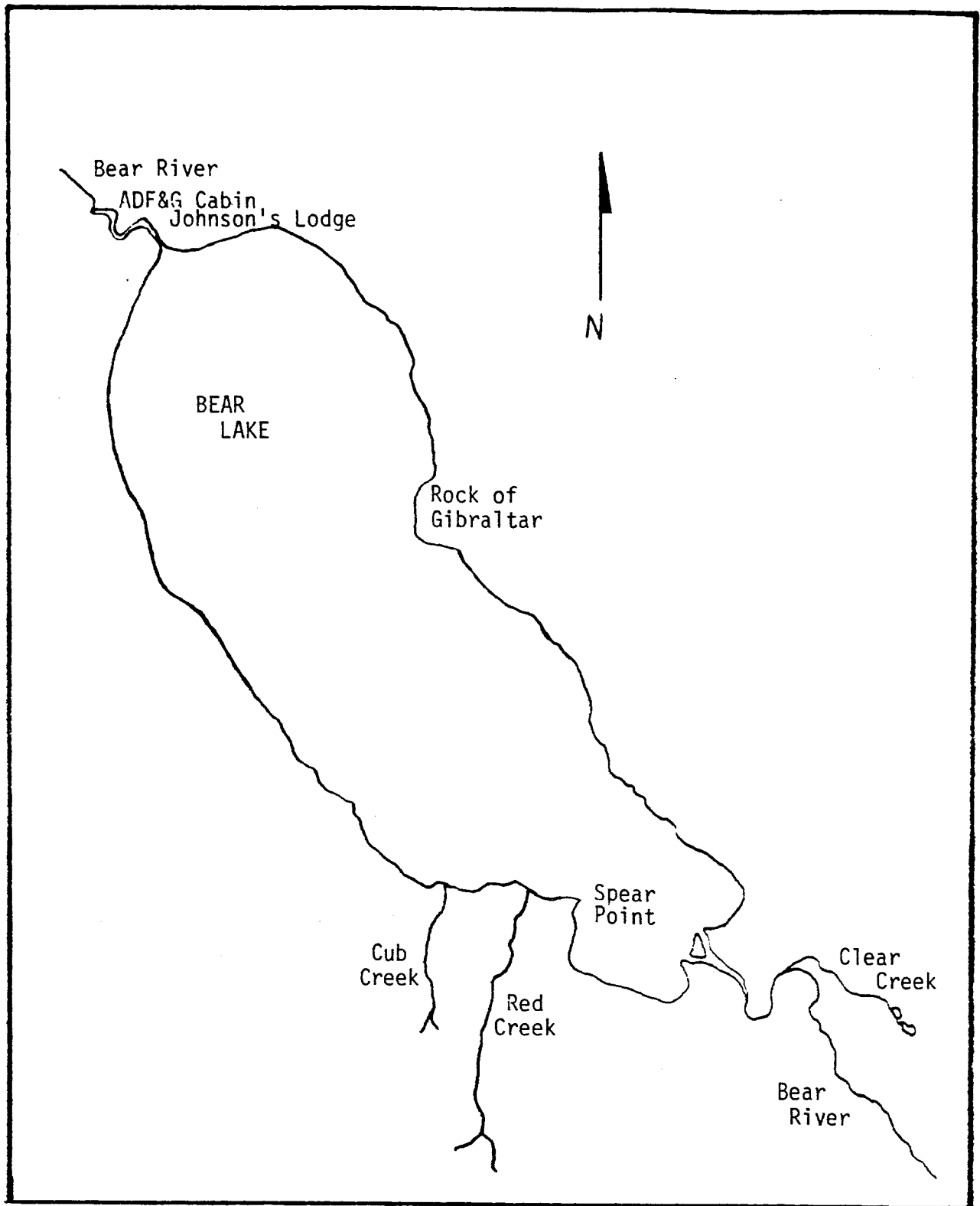


Figure 3. Map of Bear Lake drainage.

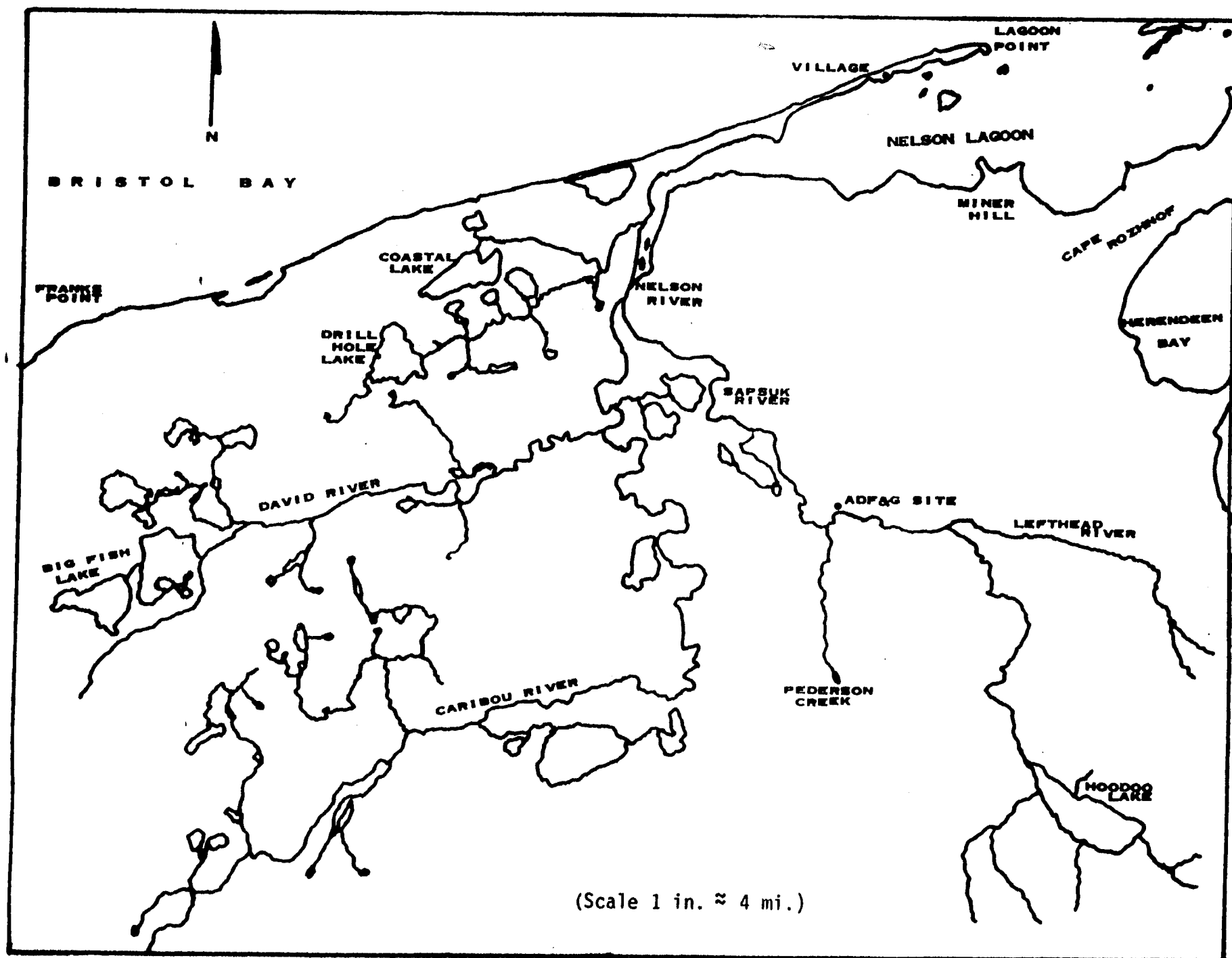


Figure 4. Map of the Nelson Lagoon drainage.

Figure 5. Map of the Alaska Peninsula Management Area from Cape Serichef to Pavlof Bay.

the adults and smolt. Two people will be assigned to each project, additional assistance, if needed, will be provided.

PROCEDURES

Escapement Enumeration

Bear River

The Bear River weir will be manned from about 24 May through 1 September. The 1989 weir will be placed in the location where the 1988 weir was installed. After the wooden tripods are in place, the tables should be loaded with sand bags. After the stringers, pickets and catwalk are in place, sand bags should be stacked from the catwalk to the top of the tripod against the back legs of the tripod.

After the weir is fully operational, the counting tower should be made ready in case the weir washes out. The counting panels for the tower should be repainted and installed along the river bottom opposite the lower tower. Counting procedures for Bear River tower would be the same as those described for Nelson River tower.

The main objective of the Bear River weir project is to record the number of salmon escaping into Bear Lake. Large numbers of fish (+200) should not be allowed to stage behind the weir. If fish start to accumulate behind the weir, open up the weir and count them through.

Use two tally whackers while counting; one to keep track of the sockeye adults and the other to keep track of the sockeye jacks. Any sockeye salmon under 16 inches (400 mm) in total length will be considered jacks. Use the counting form provided (Table 1). Make note of other species, do not lump them together, count the individual species.

Weir maintenance is very important to prevent weir washout. Keep the weir clean of debris and check the bottom twice a day to make sure it is fish tight. If the weir cannot be used for some reason, the tower will be used and the procedures for the Nelson River Tower will be utilized.

Nelson River Weir

The Nelson River weir will be manned from about 15 May through 31 July. The weir is a new design similar to one used on the Susitna River in 1988. The weir should be fish tight before salmon arrive (about mid-June).

After the weir is fully operational, the counting tower should be made ready in case the weir fails. The counting panels should be repainted and installed on the river bottom in its usual location.

The main objective of the Nelson River weir is to record the number of salmon escaping into the Hoodoo Lake-Sapsuk River. Large numbers of fish

Table 1. Daily counting tower form.

DAILY COUNTING TOWER FORM
EXAMPLE

LOCATION NELSON RIVER

DATE JULY 13 1987 SPECIES REDS

NIGHT COUNT ESTIMATE

Previous Days Last Hour Estimate 435

Today's First Hour Estimate 150

Total 585
2/Total 292.5 Night Est.

Number of Night Hours 7 x 292.5 = 2048

JACK SOCKEYE

(Disregard if this page is used for species other than sockeye)

18

3

21

2/Total 10.5 Night Est.

7 x 10.5 = 74

Count A + Count B = Total X 3 = Hour Est. Daily Accum.

Count A + Count B = Total X 3 = Hour Estimate

TOTAL SALMON (Adults & Jacks)						(JACKS ONLY)			
7	29	21	50	150	2198	0	1	1	3
8	21	21	42	126	2324	1	1	2	6
9	21	7	28	84	2408	1	1	2	6
10	7	11	18	54	2462	1	0	1	3
11	11	25	36	108	2570				
12	25	2	27	81	2651				
1	2	0	2	6	2657				
2	0	27	27	81	2738				
3	27	43	70	210	2948				
4	43	185	228	684	3632				
5	185	203	388	1164	4796				
6	203	110	313	939	5735				
7	110	100	210	630	6365				
8	100	64	164	492	6857				
9	64	106	170	510	7367				
10	106	78	184	552	7919				
11	78	39	117	351	8270				

Daily Total 8270

Yesterdays Accumulated Total 96,615

Current Accumulated Total 104,885

Daily Total

Yesterdays Accumulated Total

Current Accumulated Total

Water level: .88'
Precipitation: .10"
Wind : 20 w
Ceiling: 400 solid
Visibility: 3 miles
Water Temp MAX 10'
MIN 6.5

(+200) should not be allowed to stay behind the weir. If fish start to accumulate behind the weir, open up a fish gate and count them through.

Use of two to four tally wackers may be necessary for counting; sockeye adults, sockeye jacks, chum salmon and chinook or coho salmon. Any sockeye salmon under 400 mm in length will be considered a jack. Use the counting form provided.

As with Bear River, weir maintenance is important. Keep the weir clean of debris and check to ensure the weir is fish tight. If the weir cannot be used, the tower and the procedures for the Nelson River Tower will be utilized.

Nelson River Tower

Nelson River Tower will be used if the weir does not operate. The first task will be to paint and install the counting panels. Logbooks are provided for recording count data.

Counting Procedures are as follows:

Hour One: Counts are made during the first 10 minutes and last 10 minutes of the hour. The counts are added together and multiplied by 3 to obtain the hour one estimate.

Hour Two: No actual counts are made. The count is estimated by adding the last count in hour one to the first count in hour three and multiplying by 3.

Hour Three: Counts are made during the first 10 minutes and last 10 minutes of the hour. The counts are added together and multiplied by 3 to obtain the hour three estimate. The same procedure as during hour one.

Hour Four: No actual counts are made. The count is estimated by adding the last count in hour three to the first count in hour five and multiplying by 3.

This procedure is repeated throughout the balance of the day until the last count. Due to poor visibility caused by darkness during the end of the last hour, two 10 minute counts are made at the beginning of the hour. The first 10 minute count is used along with the last 10 minute count prior to the previous hour to calculate the previous hour's count. To calculate the last hour's count, add the two 10 minute counts together and multiply by 3.

The night count estimate is made by averaging the last hourly count of day A with the first hourly count of day B and multiplying the average by the number of night hours.

Use the Daily Tower Counting Form to calculate daily escapement and the reporting form (Table 2) when radioing counts into town. Calculations should be double checked for errors.

Nelson River and
Bear River Weir Escapement Reporting Form

[illegible]

Urilia Bay, Middle Lagoon, and Thin Point Projects

Activities for these projects will be supervised by the Area Management Biologist (Arnie Shaul). Basic duties will include estimates of escapement by species, movements of fish, catch reports, and other assigned duties.

Sampling kits will be provided for each project. In Urilia Bay and Middle Lagoon it may be possible to sample the commercial catch. When sampling the commercial catch priority should be given to sampling seine caught fish. For terminal fisheries seine caught fish have the same population characteristics as the escapement. For the Thin Point project it may be possible to sample subsistence caught fish, priority should be given to seine caught fish but gill net caught fish should be sampled if they are available.

A goal of 235 adult fish samples per week has been established.

Follow the techniques for sampling as found in Appendix A.

Send samples to Port Moller for processing as soon after collection as possible.

Sampling to determine age, length, and sex of adult escapement

Bear and Nelson Rivers

Escapement sampling will be conducted by the crews stationed at Bear and Nelson Rivers. Sockeye will be the primary species sampled except for Nelson River where chum salmon should also be sampled for age data. Samples will be collected at both weirs using the weir live box trap. If the weir washes out, samples will be seined. The Area Research Biologist will visit each camp early in the season to make sure scales are being worked up properly. Appendix A describes sampling and recording procedures.

A goal of 235 adult fish samples per week per species has been established. Statistical weeks are listed in Table 3. Starting Monday, the second day of the statistical week, attempt to collect the entire 235 fish sample. If this cannot be done, continue to collect samples the following days until the goal is reached or the statistical week terminates.

Smolt Sampling

Outmigrating sockeye smolt will be collected at Bear Lake. After the weir and tower are operational, sampling will begin. A weekly sample size of 200 smolt will be collected during the duration of the smolt outmigration, probably 4 to 6 weeks. Smolt will be sampled for age, weight, and length composition. Appendix B gives sampling and recording procedures. Sampling will begin on Tuesday, the third day of the statistical week, so as not to

Table 3. 1989 statistical weeks.

Statistical Week	Calendar Dates	Statistical Week	Calendar Dates
1	01-Jan to 07-Jan	28	09-Jul to 15-Jul
2	08-Jan to 14-Jan	29	16-Jul to 22-Jul
3	15-Jan to 21-Jan	30	23-Jul to 29-Jul
4	22-Jan to 28-Jan	31	30-Jul to 05-Aug
5	29-Jan to 04-Feb	32	06-Aug to 12-Aug
6	05-Feb to 11-Feb	33	13-Aug to 19-Aug
7	12-Feb to 18-Feb	34	20-Aug to 26-Aug
8	19-Feb to 25-Feb	35	27-Aug to 02-Sep
9	26-Feb to 04-Mar	36	03-Sep to 09-Sep
10	05-Mar to 11-Mar	37	10-Sep to 16-Sep
11	12-Mar to 18-Mar	38	17-Sep to 23-Sep
12	19-Mar to 25-Mar	39	24-Sep to 30-Sep
13	26-Mar to 01-Apr	40	01-Oct to 07-Oct
14	02-Apr to 08-Apr	41	08-Oct to 14-Oct
15	09-Apr to 15-Apr	42	15-Oct to 21-Oct
16	16-Apr to 22-Apr	43	22-Oct to 28-Oct
17	23-Apr to 29-Apr	44	29-Oct to 04-Nov
18	30-Apr to 06-May	45	05-Nov to 11-Nov
19	07-May to 13-May	46	12-Nov to 18-Nov
20	14-May to 20-May	47	19-Nov to 25-Nov
21	21-May to 27-May	48	26-Nov to 02-Dec
22	28-May to 03-Jun	49	03-Dec to 09-Dec
23	04-Jun to 10-Jun	50	10-Dec to 16-Dec
24	11-Jun to 17-Jun	51	17-Dec to 23-Dec
25	18-Jun to 24-Jun	52	24-Dec to 30-Dec
26	25-Jun to 01-Jul	53	31-Dec to 31-Dec
27	02-Jul to 08-Jul		

interfere with adult sampling. Estimate the peak of migration and note if migration is light, moderate, or heavy (peak).

A fyke net will be located in a riffle area so that the water velocity is just below the washout threshold of the gear. A good procedure is to attach the net behind the weir about mid river using the tripods as a support for the net. The net will be fished as long as it is necessary to capture 200 smolt. Near dusk is when outmigration usually peaks. If 200 smolt are not captured on Tuesday, sampling will continue until the goal is met or the statistical week terminates.

General Camp Maintenance and Procedures

During the season the duties outlined above may take longer than 37.5 hours/week to accomplish. When this happens at Bear River notify Jim McCullough and at Nelson River notify Len Schwarz. They will decide what projects take priority and whether or not to authorize overtime. No overtime may be worked or claimed unless it is first authorized.

Cabin and facilities maintenance is an important aspect of being able to accomplish objectives comfortably. Maintenance can usually be accomplished during slow periods of the season. As soon as the camp is established, look the situation over and make a list of projects that need to be accomplished. Send in a list of materials needed to do these jobs. Also, try to anticipate problems before they occur. Ordering replacement parts before a deteriorating piece of equipment actually breaks will prevent long delays in repair due to the logistics involved.

Appendix C provides general information including radio schedules, ordering food and supplies, compliance with ADF&G regulations, equipment/maintenance, procedures regarding violations, emergencies, firearms, bears, garbage, boating, fire and first aid safety, drinking water, personal gear and pets, compatibility of field personnel, and cleanliness of cabin.

DATA REPORTING

Prior to June 1, 1990 the ARB will author a Technical Fisheries Report which covers the results of the 1989 escapement sampling season. Prior to 1 June 1990 the Area Management Biologist will author an Annual Management Report which covers the results of the 1989 escapement enumeration.

APPENDIX A

Scale Sampling Techniques

ALASKA PENINSULA SCALE SAMPLING TECHNIQUE

The following is an explanation of how salmon scale samples are taken. If you have not taken scales before or if you have any questions ask the Alaska Peninsula Research Biologist, Jim McCullough, to demonstrate the sampling procedure. Scales must be readable to be useful, so follow proper technique when sampling.

Important Points to Remember

Gum Cards

A scale card is a gum-backed sheet numbered 1 through 40. Samples are placed on the cards with no attempt to separate the fish by their sex.

It is important to keep the gum card dry at all times. If weather does not allow you to do this it is best to suspend sampling until dryer conditions prevail. A wet gum card is useless as the scales will shift and come off and prevent a readable impression from being taken.

A new scale card is started for each day. Even if a card is not filled a new card is still to be started for each day. Also, a different card is to be used for each location, i.e. Bear River vs. Nelson River. It is important that scale cards and numbers match the corresponding AWL sheet.

Scales

1. Clean the scale by wetting it and rubbing it between your fingers. Make sure no dirt, slime, and skin (no silver color) remains on the scale.
2. Mount the scale on the gum card with the ridged side up. The ridged side is the same side that is exposed on the salmon.
3. One scale will be taken from sockeye and chum. Two scales will be taken for coho and three scales for king salmon.
4. Take the preferred scale if it is available, if not available take a scale but note it is not preferred.
5. Scales should be neat, clean, and orderly.

Age-Weight-Length (AWL) Sampling Form

Age - Scale samples are taken for age.

Weight - Taken to nearest tenth of a kilogram on any adult fish not being returned live to the water.

Length - Taken with the fish laying flat from the mid-eye point to the fork of the tail. Measure to the nearest millimeter.

*** Fill in all information on the AWL form.

*** Each AWL form should match up with the appropriate scale card.

**Length, Sex, and Scale Sampling Procedure for Sampling:
Using Mark-Sense Forms
(Recommended by Statewide Stock Biology Group, May 1985)**

INTRODUCTION:

Salmon from the catch are sampled for length, sex, and scales annually by field crews throughout the state. This data base is essential to sound management of the State's salmon resources. This information is drawn upon by management and research biologists for: (1) forecasting run strengths; (2) setting escapement goals; (3) examining the productivity of each system; (4) salmon growth analysis; (5) catch apportionment (based on age composition and/or scale pattern analysis); (6) in-season run estimation; and (7) to gain a better understanding of the biology of each stock.

For clarification purposes a SCALE SAMPLE and SUB-SAMPLE will be defined as follows:

SCALE SAMPLE: A data set collected from a specific sampling location, containing scales and data from a single species, collected during a single year. All data forms and scale cards of a single SAMPLE have the same statistical code. AWL and scale card number in a sample are consecutively and chronologically ordered.

SUB-SAMPLE: Any portion of a scale sample consisting of consecutively numbered AWL's and scale cards. SUB-SAMPLES usually consist of one or more time segments of a sample.

To be useful, data must be recorded on the mark-sense forms neatly and accurately. The following procedures are to be adhered to when sampling for length, sex, and scales using mark-sense AWL forms.

COMPLETING THE FORMS:

A completed mark-sense AWL form (Appendices A.1 and A.2) and accompanying gum card for sampling escapement catches of sockeye and chum salmon are shown in Appendix A.3. A completed AWL form and accompanying gum card for sampling commercial catches of chinook and coho salmon are shown in Appendices A.4 and A.5.

Complete each section of the left side of the mark-sense form using a soft No. 2 pencil and darken the corresponding blocks as shown in the figures. Make every effort to darken the entire block as partially filled blocks are often missed by the optical scanner which reads and records the data from the mark-sense AWL forms. Label only one form at a time to avoid "the carbon paper effect" and resulting stray marks.

Description:

For escapement sampling: Species/Area/Catch or
Escapement/gear type i.e. weir/Samplers (name and W-R-P).

DESCRIPTION: Sockeye Nelson River

Recorder: CSD
Wrestler: CSD
Scale Plucker: MB

Scale: JMM
Reader:

ADF&G ADULT SALMON AGE LENGTH
FORM VERSION 2.1

DO NOT WRITE IN THIS MARGIN

101945

DO NOT WRITE IN THIS AREA

CARD:	001
SPECIES:	2
DAY:	24
MONTH:	6
YEAR:	88
DISTRICT:	313
SUBDISTRICT:	30
STREAM:	003 Sapsuk
LOCATION:	ADF&G Cabin 56
PERIOD:	26
PROJECT:	3
GEAR:	Trap
MESH:	
TYPE OF LENGTH MEASUREMENT	2
NUMBER SCALES/FISH	1
# OF CARDS	1

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
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Appendix A.1. Example of opscan form for the Sapsuk River.

Example

Nelson Lagoon
Sapsuk River

HIS MARGIN

DO NOT

101944

- 91 -

A

AREA

DESCRIPTION: Snake River Bear Lake

Recorder: VDE
Wrestler: MSP
Scale Plucker: MSPScale: JAM
Reader:ADF&G ADULT SALMON AGE-LENGTH
FORM VERSION 2.1

CARD:	004
SPECIES:	2
DAY:	3
MONTH:	7
YEAR:	88
DISTRICT:	3/5
SUBDISTRICT:	11
STREAM:	002
LOCATION:	Bear Lake ADFG 55
PERIOD:	28
PROJECT:	3
GEAR:	Trap
MESH:	
TYPE OF LENGTH MEASUREMENT	2
NUMBER SCALES/ FISH	1
# OF CARDS	1

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1						
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3						
4						
5						
6						
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Appendix A.2. Example of opscan form
for the Bear River.

Example

Bear Lake

DESCRIPTION: Sockeye Bear Lake

Recorder: SMC
Dressler: HSB
Scale Plecter: HSB

Scale Reader: JWM

ADF&G ADULT SALMON AGE-LENGTH
FORM VERSION 2.1

IN THIS MARGIN

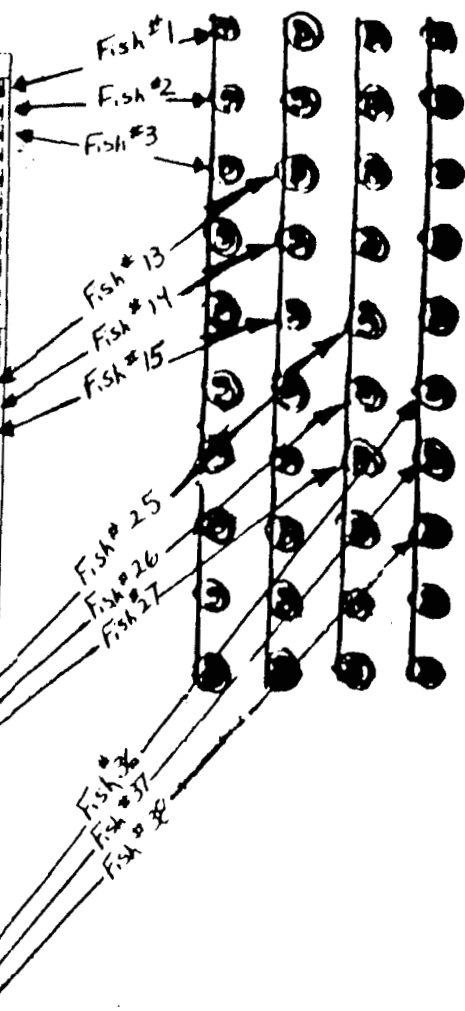
101944

CARD:	004
SPECIES:	2
DAY:	3
MONTH:	7
YEAR:	88
DISTRICT:	3/5
SUBDISTRICT:	11
STREAM:	002
LOCATION:	Bear Lake ADF&G 55
PERIOD:	28
PROJECT:	3
GEAR:	Trap
MESH:	
TYPE OF LENGTH MEASUREMENT	2
NUMBER SCALES/FISH	1
# OF CARDS	1

SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
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50					

Example

Bear Lake



Species:	Sockeye	Card No	009
Locality:	Bear River		
Stat Code:	315-11-002		
Sampling Date:	Mo. 7 Day 3 Year 88		
Gear:	Trap		
Collector(s):	Sandby, McKinnon		
Remarks:	1 scale / fish		

Appendix A.3. Example of AWL and scale cards for one scale/fish samples.

Appendix A.4. Example of AWL and scale cards for 2 scales/fish samples.

COHO/SALTARY/ESC./WEIR

Comments: Peak of coho run

DESCRIPTION: Samplers: Dinnozenzo, Pearson, Holmes Scale Reader:

ADF&O ADULT SALMON AGE-LENGTH FORM VERSION 2.1

CARD: 001 A&B

SPECIES: Coho

DAY: 25

MONTH: Sept

YEAR: 86

DISTRICT: 259

SUBDISTRICT: 41

STREAM: 415

LOCATION: Jarry Weir

PROD: 38

PROJECT: Escapement

GEAR: Weir Trap

MESH: 100

TYPE OF LENGTH MEASUREMENT: Fork

NUMBER SCALES/FISH: 2

OF CARDS: 2

100's

LENGTH

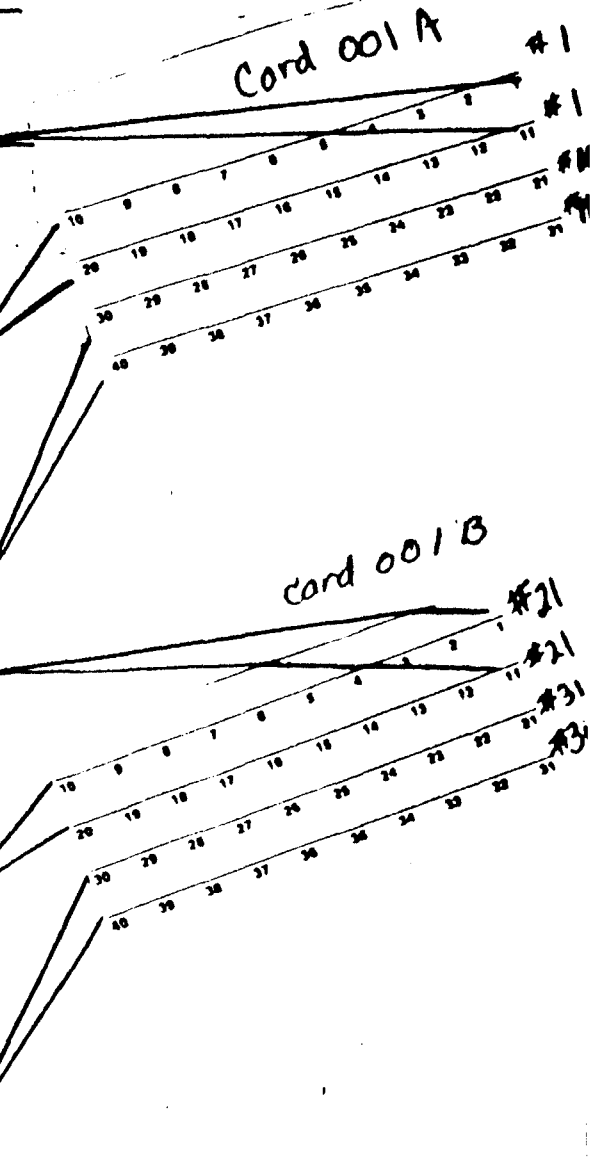
1's

AGE GROUP

AGE ERROR CODE

DO NOT WRITE IN THIS MARGIN

103131



Species: Coho Card No: 001 B
Locality: SALTARY WEIR
Stat. Code: 259-41-415-
Sampling Date: Mo. 9 Day 25 Year 86
Gear: Weir Trap
Collector(s): Dinnozenzo, Pearson, Holmes
Remarks: Peak of Run
Sample # 21-40 2 scales/fish

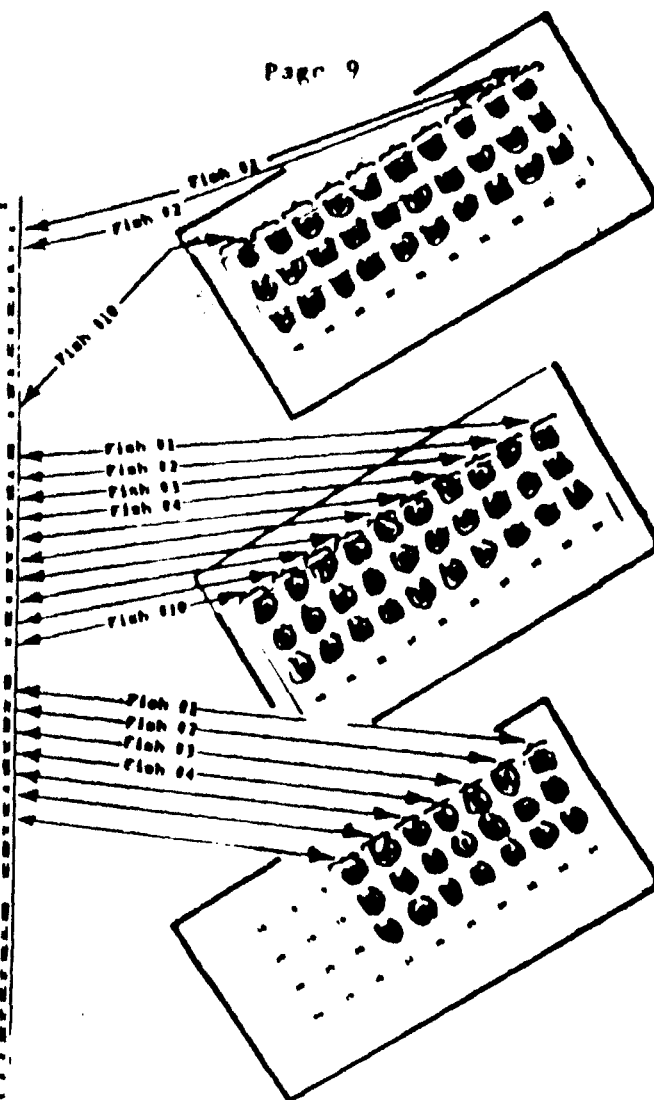
Species: Coho Card No: 001 A
Locality: SALTARY WEIR
Stat. Code: 259-41-415-
Sampling Date: Mo. 9 Day 25 Year 86
Gear: Weir trap
Collector(s): Dinnozenzo, Pearson, Holmes
Remarks: Peak of Run
Sample # 1-20 2 scales/fish

Litho Code

Appendix A.5. . A-W-L and gum corks for sampling three scales per fish.

Page 9

DESCRIPTION		FORM		VERSION	
CARD	015-017	100%	LENGTH	AGE	LENGTH
SPECIES	1				
DAY	12				
MONTH	07				
YEAR	05				
DISTRICT	113				
SUBDISTRICT					
STREAM					
LOCATION	003				
PERIOD	28				
PROJECT	1				
GEAR	05				
MESH					
TYPE OF LENGTH MEASUREMENT	2				
NUMBER SCALES/FISH	3				
NO. OF CARDS	3				



Number 14246 and the 11.7
 Country S. Africa
 Date Code 113 88
 Sampling Date the 11.7 Day 11th Year 88
 from Town
 Collector(s) Gentry (L) S. J. (P) S. J. (P)
 Remarks 2.5 vol/1.5 g

Species Chinook County El Dorado
Locality Siphon Creek State Calif
Map Code 113 Section 6
Sampling Date May 12 Year 88
Base Troll
Collector(s) Georgi, J. S. (P), S. J. (A)
Remarks 3 males fish

Name: Chen, Hui Code: 012
 Group: S1101
 Mat No: 111 001
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Card: The AWL forms and corresponding gum card(s) are numbered sequentially by date throughout the season starting with 001. A separate numbering sequence will be used for each species, gear type, district, and geographic location. Consult your port supervisor for the current card number. Sockeye and chum samples will have only 1 card per AWL form as shown in Appendix B.1. Coho and chinook samples will contain up to four cards per AWL form as shown in Appendices A.4 and A.5.

Species: Refer to the reverse side of the AWL form for the correct digit.

Day, Month, Year:
Use appropriate digits for the date the fish are caught.

District:
List only one district. Consult project leader for appropriate district, sub-district, and stream numbers.

Subdistrict:
List a single sub-district if it is known and all the fish sampled were from that single sub-district. Leave blank if more than one sub-district is involved or if the subdistrict is unknown.

Stream:
Leave blank for catch sampling; for escapement sampling consult project leader for appropriate number.

Location:
List the appropriate code as shown on Appendix A.6.

Period:
List the statistical week in which the fish were caught (Table 3).

Project:
Refer to the reverse side of the AWL form for the correct code.

Gear:
Refer to the reverse side of the AWL form.

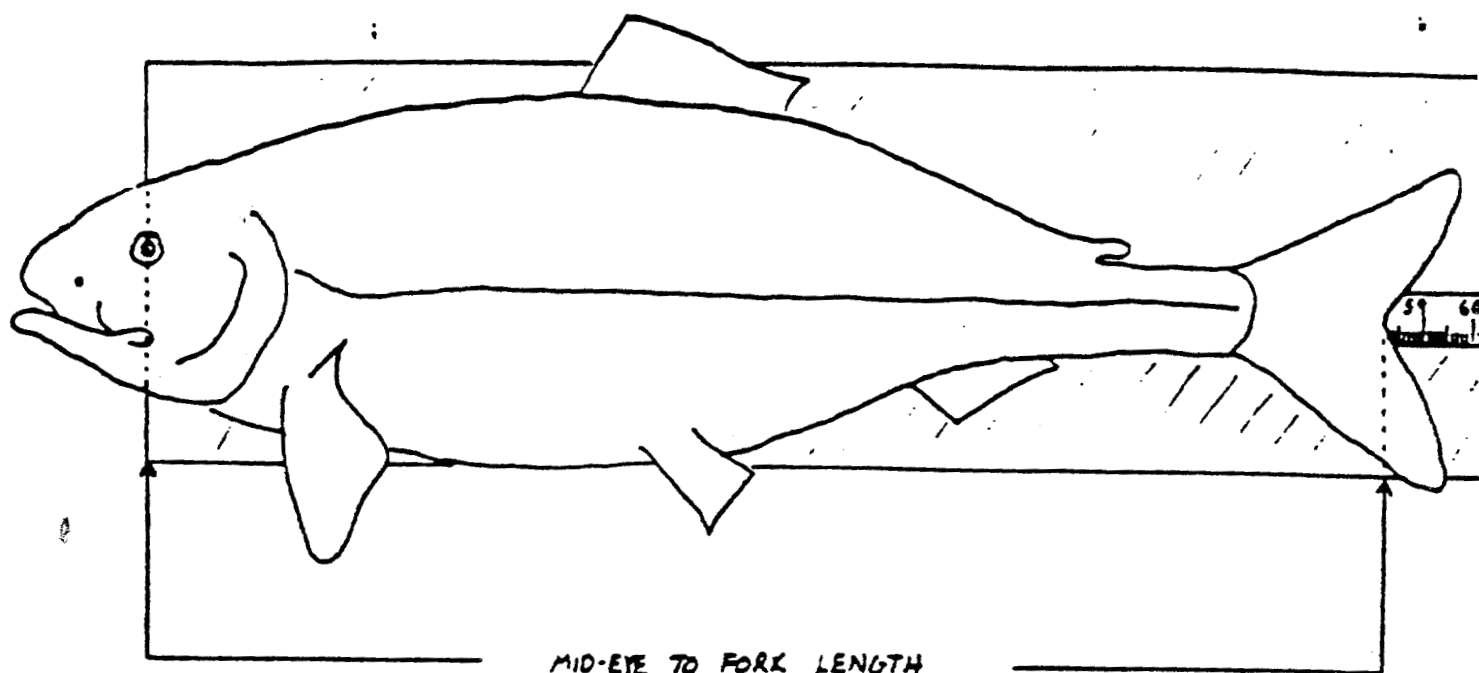
Mesh:
Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement:
Use (2) mid-eye to fork of tail (unless specifically instructed to do otherwise). Refer to Appendix A.7.

of cards:
Mark 1 when sampling sockeye and chum salmon (Appendix A.3). Mark 1A, 1B, 1C, or 1D when sampling chinook and coho salmon and write the card numbers perpendicular to the left of the fish # column as shown in Appendix A.4.

Appendix A.6. Assigned port and weir location codes. (Use under location in filling out AWL's for catch and escapement sampling.)

150 - King Cove
151 - Port Moller
052 - Dutch Harbor
053 - Akutan
054 - Sand Point
055 - Bear River, ADF&G Camp
056 - Nelson River, ADF&G Camp
057 - Canoe Bay



Because the length and form of the snout of salmon changes as the fish approaches sexual maturity, length measurements are made from the middle of the eye to the fork of the tail. The length is always recorded to the nearest millimeters. The procedure for measuring length (mid-eye to fork) of the salmon is as follows:

1. Place the salmon flat on the board with the head to your left and the dorsal fin away from you.
2. Make sure your eye is directly over the end of the board. Line the eye of the salmon up with the edge of the board and hold the head in place with your left hand. It helps to place a finger in the salmon's eye for reference.
3. Flatten and spread the tail against the board with your right hand.
4. Read the mid-eye to fork length to the nearest five millimeters.

Card:

The AWL forms and corresponding gum card(s) are numbered sequentially by date throughout the season starting with 001. A separate numbering sequence will be used for each species, gear type, district, and geographic location. Consult your port supervisor for the current card number. Sockeye and chum samples will have only 1 card per AWL form as shown in Appendix B.1. Coho and chinook samples will contain up to four cards per AWL form as shown in Appendices A.4 and A.5.

Species:

Refer to the reverse side of the AWL form for the correct digit.

Day, Month, Year:

Use appropriate digits for the date the fish are caught.

District:

List only one district. Consult project leader for appropriate district, sub-district, and stream numbers.

Subdistrict:

List a single sub-district if it is known and all the fish sampled were from that single sub-district. Leave blank if more than one sub-district is involved or if the subdistrict is unknown.

Stream:

Leave blank for catch sampling; for escapement sampling consult project leader for appropriate number.

Location:

List the appropriate code as shown on Appendix A.6.

Period:

List the statistical week in which the fish were caught (Table 3).

Project:

Refer to the reverse side of the AWL form for the correct code.

Gear:

Refer to the reverse side of the AWL form.

Mesh:

Leave blank unless specifically instructed by supervisor to do otherwise.

Type of length measurement:

Use (2) mid-eye to fork of tail (unless specifically instructed to do otherwise). Refer to Appendix A.7.

of cards:

Mark 1 when sampling sockeye and chum salmon (Appendix A.3). Mark 1A, 1B, 1C, or 1D when sampling chinook and coho salmon and write the card numbers perpendicular to the left of the fish # column as shown in Appendix A.4.

It is paramount to keep the mark-sense forms flat, dry, and clean. Fish gurry and water curling will cause data to be misinterpreted by the optical scanning machine. In general, keep the forms neat enough and legible enough to have a stranger be able to make sense out of them.

Additional data columns are available on the reverse of the AWL for individual project use. If you as a project leader use them and wish that data to be read by the opscan reader, you will need to transfer the litho code from the front of the form to the reverse.

GUM CARD(S):

Fill out the gum cards as shown in Appendices A.3 - A.5.

Species:

Write out completely (i.e., chinook, sockeye, etc.).

Locality:

For catch and escapement sampling write down area in which fish were caught followed by the word catch or escapement (i.e., Bear River escapement).

Stat. code and Sampling date:

Transfer the appropriate digits from the AWL form.

Gear:

Write out completely.

Collector(s):

Record the last name or initials of the person(s) sampling.

Remarks:

Record any pertinent information such as: number of scales per fish sampled, vessel/tender name, etc. Transfer this same information to the top margin of the AWL.

SAMPLING:

A. GENERAL

1. Sex the fish and darken M or F in the sex columns. If any difficulty was encountered in this procedure, write "I had trouble sexing these fish" on the top margin of the AWL and ask your supervisor for help as soon as possible before sexing additional fish.
2. Measure all species' length in millimeters from the middle of the eye to the fork of the tail, refer to Appendix A.7. Record length by blackening the appropriate column blocks on the AWL form. Column 3 on the AWL form is used for fish over 999 millimeters long (Big Daddy Chinook). Measure all species of salmon to the nearest mm. Check the calipers daily, before use, to ensure the accuracy of the measurements.
3. Pluck the "preferred scale" from the fish using forceps. Remove all slime, grit, and skin from the scale by moistening and rubbing between

fingers. The "preferred scale" is located on the left side of the fish, two rows above the lateral line on the diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin, refer to Appendix A.8. If the "preferred scale" is missing, select a scale within the preferred area on either the left or right side of the fish. If no scales are present in the "preferred area" on both sides of the fish, sample a scale as close to the preferred area as possible and darken the 8 under "age error code" on the AWL form.

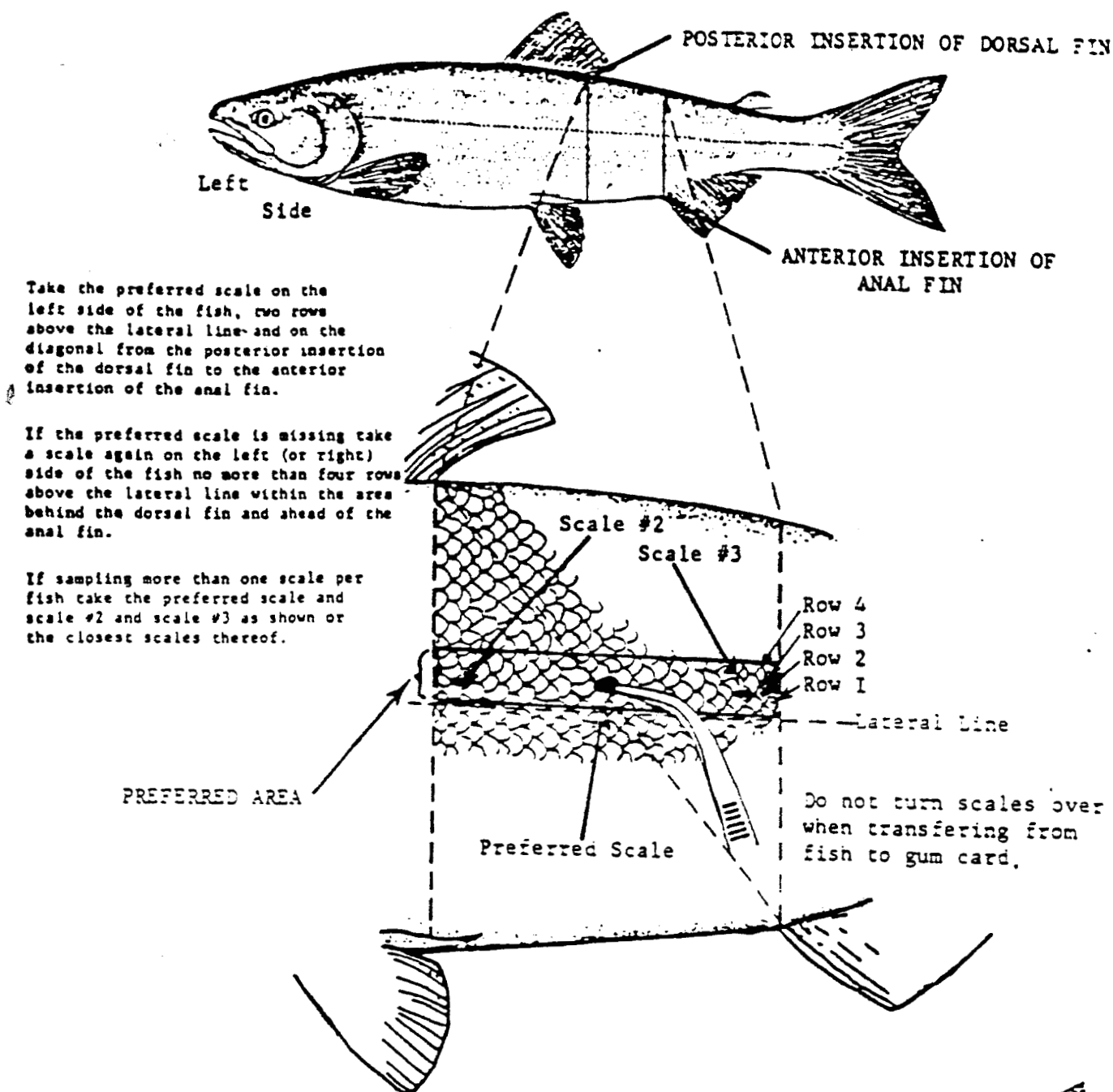
4. Clean, moisten, and mount scale on gum card directly over number 1 as shown in Appendix A.8. The side of the scale facing up on the gum card is the same as the side facing up when it was adhered to the fish. This outward facing side is referred to as the "sculptured" side of the scale. The ridges on this sculpture side can be felt with a finger nail or forceps. Mount scale with anterior end oriented toward top of gum card.
5. When sampling sockeye and chum salmon repeat steps 1 through 4 for up to 40 fish on each AWL form.
6. When taking 2 scales per fish as with chinook and coho salmon sample the "preferred scale" and scale #2 as shown in Appendix A.8. Scale #2 is one inch to the left of the "preferred scale," two rows above the lateral line. Mount the 2 scales from fish #1 over 1 and 11 on the gum card as shown in Appendix A.4. Continuing, mount the 2 scales from fish #2 over 2 and 12, etc.
7. Use plastic scale card holders to hold individual scale cards during sampling and cover the completed gum card with wax paper for storage.
8. When sampling a weired system you may use write-in-the-rain books to record the data. Keep the mark-sense forms in camp where they will be clean, dry, and flat. After sampling is done for the day transfer the data to the mark-sense forms. It is the responsibility of the data collector to transcribe the data before turning it over to the ARB.

If the write-in-the-rain paper is initially used to record the data and the data is transcribed later onto a mark-sense form, it is important that the data is transcribed correctly. Double check the entries for errors. Best results are achieved if two people do this; one person calling out the numbers, and the second person filling in the form. Send the gum cards, mark-sense forms and the write-in-the-rain pages to the Area Research Biologist periodically.

9. Miscellaneous:

- a. When scales are sampled in wet conditions it is difficult to mount scales in a fashion so as to result in a good scale impression being made. Glue often obscures scale features and scales frequently adhere poorly to the card. In this situation the scales should be remounted.

Appendix A.8. Scale sampling procedure showing the preferred scale sampling area on an adult salmon.



NOTE: Mount scales with anterior portion of scale oriented toward top of card.

Place scales directly over number on gum card.

10	9	8	7	6	5	4	3	2
20	19	18	17	16	15	14	13	12
30	29	28	27	26	25	24	23	22
40	39	38	37	36	35	34	33	32

- b. For adipose clipped fish record the head tag number on the corresponding row in the first five columns on the reverse side of the AWL.
- c. Look down the form from two angles after the data has been recorded to pick up any glaring mistakes. A common error occurs, for instance, in placing both the 4 and 7 of a 475 mm fish in the 100's column with nothing in the 10's column.
- d. Keep all fish gurry off forms and erase any stray marks on the forms before turning them into your supervisor.
- e. Write in all comments explicitly and completely under remarks, transfer remarks to top margin of AWL.
- f. Responsibility for accuracy lies first with the primary data collector(s). The ARB will return sloppy or incomplete data to individual collectors. After editing a form, place your initials next to card #, but not in left margin.

- 10. As soon as possible after completion send the samples and mark-sense forms to the ARB in Port Moller. During scheduled radio calls before and following the sending of data to the ARB, the crew leader will notify the ARB: 1) that the data is being mailed (use a moisture-proof container); 2) what data is being sent; 3) when delivery is expected in Port Moller; and 4) who is transporting the data. It is important that these steps are followed to insure delivery.

B. SAMPLING SCENARIOS:

1. Differing size crews:

- a. One person: Wrestle the fish into the measuring board, wearing a glove on one hand. Measure the fish and write the sex and length down on the measuring board to be transferred to the AWL after ten fish have been measured. Next, pluck the preferred scale(s), clean, and mount on the gum card which is taped to the AWL on the clipboard which is sitting on the end of the measuring board. After ten fish have been processed, remove the glove and record the sexes and lengths on the AWL with your clean hand. A slime rag may be helpful.
- b. Two person:
 - (1) When sampling more than one scale per fish, one person can wrestle the fish and record data while the other plucks and mounts scales. The wrestler needs to wear a glove that he can slip off his writing hand to record the sex and length data on the AWL form.
 - (2) When sampling one scale per fish, the person plucking the scales also records the data.

- c. Three persons: One person wrestles the fish, one plucks and mounts the scales, and the third records the data.
2. Sampling tote to tote:
 - a. When sampling for 2 or 3 scales per fish (chinook and coho) use two persons.
 - b. When sampling for 1 scale per fish (sockeye and chum) use three persons, if available.

SCALE SAMPLING CHECKLIST

Clipboard
Gum Cards
AWL's
Pencils (No.2)

Forceps
Gloves
Plastic scale card
holders

Sampling Manual
Wax paper inserts
Measuring board or
Calipers

SOME REMINDERS

1. For greater efficiency in scale reading and digitizing, mount scales with anterior end toward top of scale card.
2. AWL's should be carefully edited before submitting to ARB. Re-check header information on AWL's; make sure all available information is filled in. Take extra care to use the correct statistical week for the sampling or catch date. Page numbers should not be repeated; a frequent error is to begin a week's sample with the last page number used the week before. This is particularly important if the data regularly sent to town; it is easy to forget which numbers were used. Crew leaders should take time to ensure that the boxes are being blackened correctly, if the boxes are sloppily marked the optical scanner records the information incorrectly or misses it entirely. Keep marks within each rectangle and completely fill them. After AWL's are edited, place editor's initial next to page number, but not in left margin.
3. Check to make sure error codes are being used correctly, i.e. error code 7 is wrong species, error code 8 is non-referred. Error code 6 is for the use of the scale reader, it refers to the reabsorption of the scale.
4. Transfer important comments from scale cards to AWL's. After pressing scales, the cards are seldom referred to again, and important remarks can be lost. Write comments in the top margin (not on theft side) or on the reverse of the AWL. If there is not room on the AWL to completely explain the remarks, use a separate piece of paper.

5. Never put data from different dates on one AWL or one scale card. Even if only one scale is collected that day, begin a new card and AWL for the next day.
6. If weights are taken, they may be noted in the right margin of the AWL during sampling, but be sure to transfer the weights to the appropriate columns on the reverse of the AWL before submitting it to the ARB.
7. The data processing program uses the "litho code" on the AWL. (It is located in the lower left margin of the AWL.) It helps if the AWL's are used in the order of this code. It should not be hard to keep them in order if they are arranged that way before page numbering. Those who sample different areas throughout the season can arrange the litho codes in order before each sample is taken.
8. If AWL's get wrinkled or splotched they should be copied over before submitting to the ARB. The optical scanning computer will misread or reject wrinkled sheets.

APPENDIX B

Procedure for Sampling Salmon Smolt

At weekly intervals beginning after the camp is established sockeye smolt will be sampled for length, weight, and age data. Smolt sampling will terminate when the fyke net fails to capture more than 10 smolt over a 24 hour period and after consulting with the ARB.

The sample size goal per week is 200 sockeye smolt. In the event that more than the required sample size is captured place the smolt in a large container and stir to assure randomness of the smolt. When the smolt are randomly distributed a small dip net will be used to remove a sub-sample, this procedure will be repeated until the weekly sampling goal of 200 sockeye smolt is met. The remaining smolt will immediately be returned to the river.

Smolt samples will be kept wet and worked up the day following their capture. A smolt sampling day encompasses the 24 hours between noon of one day to noon of the following day and is identified by the calendar date corresponding to the first 12 hour period. Age, weight and length data will be recorded on adult AWL forms as no smolt AWL forms exist (Appendix B.1). Refer to Appendix A and B on the standard procedures for recording data on an AWL form. Record at the top of each AWL form: personnel collecting the data, length of time the gear was fished, other species and their numbers captured.

A knife will be used to remove 5-10 scales from the preferred area, Appendix B.2. The scales will be mounted on a glass slide as illustrated in Appendix B.3. The left portion of each slide will be labeled with: sample site, location, date, specimen number and data collectors.

Smolt lengths will be measured to the nearest millimeter, from the tip of the snout to the fork of the tail, Appendix B.4.

Excess water will be removed from the smolt before weighing by using a paper towel as a blotter. Individual smolt weights will be recovered to the nearest gram.

DO NOT WRITE IN THIS MARGIN

101943

DO NOT WRITE IN THIS AREA

DESCRIPTION: Sockeye Bear
Smolt Lake

Sundby
McCullough

Time: 2.25 hrs.

278 Sockeye
14 Octo

ADF&G ADULT SALMON AGE LENGTH
FORM VERSION 2.1

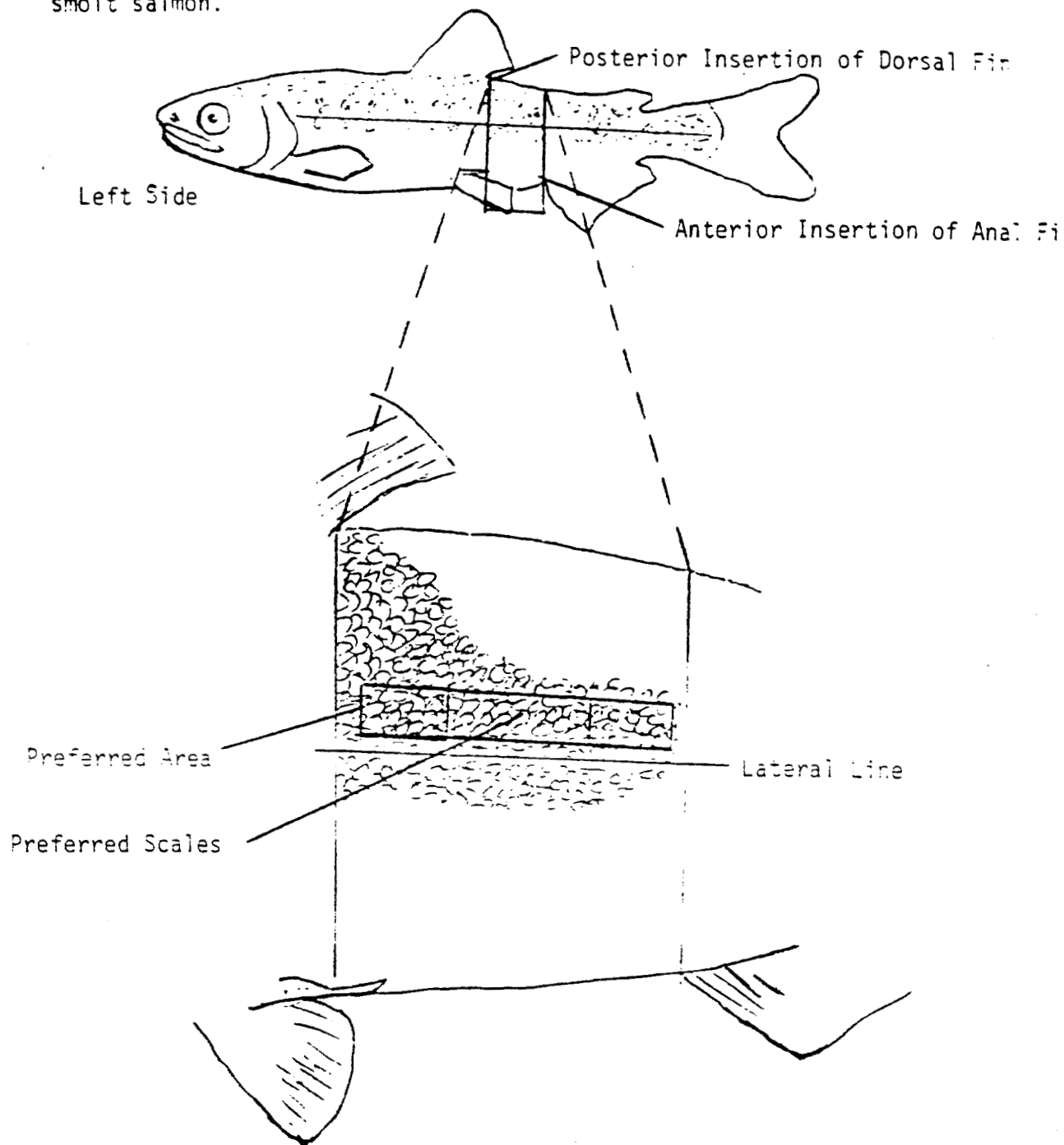
CARD:	1
SPECIES:	2
DAY:	17
MONTH:	6
YEAR:	88
DISTRICT:	315
SUBDISTRICT:	11
STREAM:	002
LOCATION:	055
PERIOD:	25
PROJECT:	3
GEAR:	Trap
MESH:	
TYPE OF LENGTH MEASUREMENT	1
NUMBER SCALES/FISH	0000
# OF CARDS	0000

#	SEX	100's	LENGTH	1's	AGE GROUP	AGE ERROR CODE
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
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Appendix B.1. Example of opscan form
for the Bear Lake smolt.

Example
Bear Lake
Smolt

Appendix B.2. Scale sampling procedure showing the preferred scale sampling area on a smolt salmon.



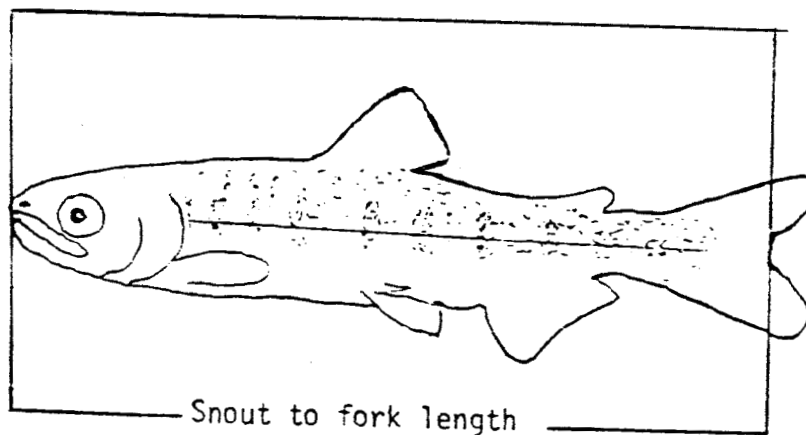
Appendix B.3. Salmon smolt glass slide example.

Location
Collection Date
Fish Reference Number
Collector
Collector

Bear River					
7/02/86					
#100-104					
Whelan					
Perry					
	Number	Number	Number	Number	Number
	100	101	102	103	104

0

Appendix B.4. Measuring smolt length.



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DEPARTMENT OF
COMMERCE
PUBLICATION



NOAA Technical Memorandum NMFS ABFL-2

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

A Guide to the Collection and Identification of Presmolt Pacific Salmon in Alaska with an Illustrated Key

MILTON B. TRAUTMAN

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- NMFS ABFL-1. An improved incubator for salmonids and results of preliminary tests of its use. By Jack E. Bailey and William R. Heard.
- NMFS ABFL-2. A Guide to the Collection and Identification of Presmolt Pacific Salmon in Alaska with an Illustrated Key. By Milton B. Trautman.

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MILTON B. TRAUTMAN



SEATTLE, WA

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A Guide to the Collection and Identification of Presmolt Pacific Salmon in Alaska with an Illustrated Key

MILTON B. TRAUTMAN¹

ABSTRACT

This field and laboratory key contains recommendations for types of equipment needed, instructions for preserving and labeling specimens, and descriptions of the characters used in identifying five species of Pacific salmon. The key is illustrated with six line figures: 1) juvenile salmon, 2) the first gill arch, 3) head with gill arch in situ, 4) first gill arch and eye for comparison with longest rakers, 5) method of counting anal fin rays, and 6) ventral surface of head showing branchiostegals. Five plates of stippled line drawings of five lengths (25 to 110 mm fork length) for each of the five species of Pacific salmon, an annotated opposable key, and a glossary are also included.

INTRODUCTION

As adults, the five species² of Pacific salmon of the genus *Oncorhynchus* inhabiting western North American waters are easily identified, but as subadults or as smolts in silvery coloration, they are less easily recognized. As juveniles less than 125 mm (5 inches) in fork length (FL), they may be quite difficult to identify. In addition, characters by which presmolt juveniles can be distinguished may vary with geographic area.

Several keys for identification of juvenile salmon have been published, most of which utilize the number, length, and shape of the gill rakers on the first gill arch; number of pyloric caeca and branchiostegals; and absence of parr marks, or if present, their size and shape (Foerster and Pritchard, 1935; Schultz, 1936; Haig-Brown, 1947; Clemens and Wilby, 1961; McPhail and Lindsey, 1970; Wilimovsky³). In addition to

the above characters, the key in this paper emphasizes and illustrates the distribution of those chromatophores (usually melanophores) which are reliable enough to aid in the specific identification of juveniles.

This key describes the characters typical of presmolt juveniles of the five species of Pacific salmon in Alaska. The common names recommended by the American Fisheries Society (Bailey et al., 1970, p. 17) are used, despite the fact that other names appear to be in more general use. These other names are inserted in parentheses after their respective species. The Atlantic salmon (*Salmo salar*), and some other salmonoids are included in the key because of their resemblance to Pacific salmon.

Before presenting the key, it appears advisable to describe the equipment and methods I recommend for preserving specimens, labeling specimens, and counting, measuring, and removing parts of specimens, so that those not acquainted with my procedures may more accurately and quickly identify their material.

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² A sixth species, *O. masou* (Brevoort), inhabits the streams of eastern Asia from the Okhotsk Sea to Formosa.

³ N. J. Wilimovsky, 1958. Provisional keys to the fishes of Alaska. On file Natl. Mar. Fish. Serv., Auke Bay Fish. Lab., Auke Bay, AK 99821.

RECOMMENDED EQUIPMENT

Magnifiers: Magnification in the range of 4 to 30 will prove helpful in identification of juvenile salmon. A binocular microscope having such a range is the most satisfactory, but any type of magnifier of more than 4 power and less than 30 may be used provided it is not necessary to use one's hand to hold it—usually both hands are needed to manipulate a specimen. In the field, a binocular unit containing lenses inserted in a frame or headstrap or a jeweler's eye magnifier (especially if one wears glasses) may be used.

Forceps: Four or five inches long with straight or curved tips—for lifting fins, holding back gill covers, etc.

Scalpel: A sharp blade an inch or two long—for removing gill arches, opening body cavities, etc.

Teasing needle: A needle inserted in a wooden or metal handle—for separating closely set gill rakers, etc.

Dividers: For measuring and comparing various body parts; dividers in which one or both legs can be "broken" are the most satisfactory.

Scissors: About 6 inches long with the blades or cutting surface of about 1 inch.

Ruler: Graduated in millimeters to measure fish lengths and parts; one which includes inches also desirable.

PRESERVING SPECIMENS

The careful preserving of specimens cannot be too strongly emphasized. Much time is lost in attempting to identify improperly preserved fishes; it is only when properly preserved that they may be rapidly and correctly identified. Frequently, juvenile salmon that have died in nets become soft, bleached, and torn. For the sake of accuracy it is better not to attempt to identify such material.

To preserve juveniles, upon capture place them in a solution of 1 part Formalin to 9 parts water. If live fishes are placed in too strong a Formalin solution, they may die with their mouths widely agape or the chromatophores may close so tightly as to be difficult to detect. If placed in too weak a Formalin solution, the fishes become bleached and soft and may decompose. If fishes are to be preserved for more than a year (or permanently),

leave them in the Formalin solution at least 1 wk and if possible no longer than 4 mo. When fish are removed from the Formalin solution, soak them in water for 24 to 48 hr; then place them in a solution containing 70% ethyl alcohol and 30% water or 35% isopropyl alcohol and 65% water.

Do not crowd or pack fishes in a container, especially if they are alive or only recently dead. Fresh fishes, if packed too tightly, will become permanently deformed upon hardening in Formalin, will be bleached where their bodies come in close contact, or will decompose. A container is too crowded if the fishes will not readily move as the container is slowly rotated or shaken. When sufficient room is allowed, identification will be facilitated because the fishes will harden without discoloring; bodies and fins will not be deformed, twisted, or broken; and the chromatophores will remain nearly or fully open.

LABELING SPECIMENS

Labeling specimens fully and properly is of great importance; unlabeled or mislabeled specimens are of little or no value. Put the label with the specimens at the time the fishes are preserved. Label paper should remain firm when wet and should not become pulpy. Write clearly with pencil or permanent ink, recording the following data.

Field Number

Use your own or a department number. A satisfactory method is to use the first initial of your surname or your full surname, the last two digits of the year, and your collection number. Thus, if Joe Brown in 1962 preserves his fifth collection, he writes B-62-5 or Brown-62-5; if for the Department of Salmon Investigations he writes, SI-62-5. When a departmental symbol is used, it often is desirable for the collector to add his initials or name to the label.

Name of Water Body and Locality

Use names on standard maps. Whenever possible, avoid temporary or local names, such as

Brown's fishing camp. An example of a brief but adequate recording is: Alaska, Naknek River System, Katmai National Monument, Brooks Lake.

Date

Include the month, day, and year and, if pertinent, the hour.

The following additional information may be needed at times.

Method of Capture

Describe type of gear and size if significant, i.e., seine (2 cm mesh), fry net (1 cm mesh), trawl (1 cm bag), etc.

Temperature

Measure temperature of air and/or water. If water is ice-covered, what percent?

Other Water Conditions

If a stream: estimate its average width and maximum depth; if tidal and brackish, to what

extent; degree of turbidity and source—glacial silt, plankton, etc.; degree of gradient—low, moderate, or high; percentage of stream in pools, with or without current; percentage of stream in riffles, whether flow is sluggish, moderate, or swift; dominant bottom types—sand, gravel, boulders, bedrock, muck, silt, etc.; aquatic vegetation—submerged, emergent, or both (name dominant species or genera if known). If a lake or bay: state whether fresh, brackish, or saline; if tidal, state to what extent; estimate size and possible depth; give degree of turbidity, type of bottom, and amount and kinds of aquatic vegetation.

Remarks

Describe anything that may aid in identification of the fishes, such as peculiar markings, habits, or habitats.

CHARACTERS USED IN IDENTIFYING SPECIES

A juvenile salmon is shown in Figure 1 to assist in recognizing and defining the characters and the counts and measurements used when keying out a specimen.

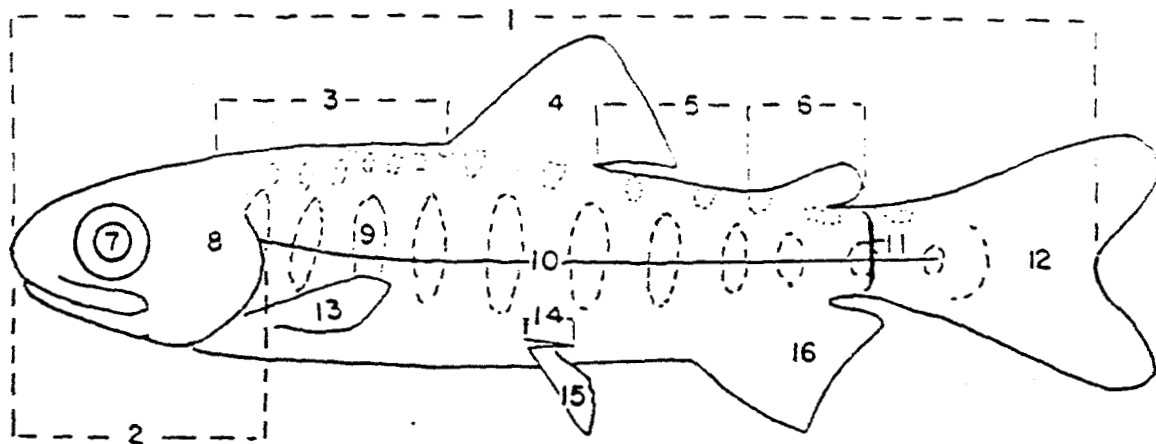
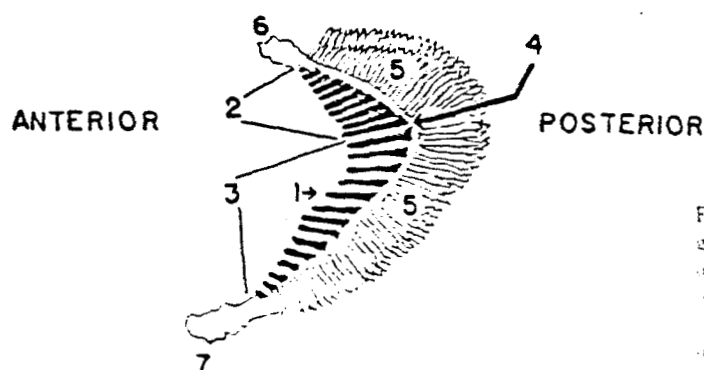


Figure 1.—Juvenile salmon, illustrating parts and methods of measuring: 1: fork length; 2: head length; 3: predorsal ridge; 4: dorsal fin; 5: portion of postdorsal ridge between posterior end of dorsal fin base and origin of adipose fin; 6: adipose fin; 7: pupil of eye; 8: gill cover, beneath which is gill chamber containing gill arches; 9: a parr mark; 10: lateral line; 11: caudal peduncle; 12: caudal fin or tail; 13: pectoral fin; 14: axillary process or scale; 15: pelvic fin; 16: anal fin.

First Gill Arch

Beneath each gill cover are four fully formed gill arches: the first gill arch on either side is the part used for specific identification. A gill arch (Fig. 2) consists primarily of a bony central arch to which the gill rakers are attached anteriorly, the gill filaments (lamellae) posteriorly. The gill rakers prevent solid substances such as food from being carried out through the branchial clefts and protect the delicate gill filaments. The numbers of gill rakers vary somewhat among individuals of each species of salmon, but the difference in average number between some species is sufficiently great to enable one to use them as specific characters.

The rakers on the gill arch may be counted as a unit, or the upper and lower limbs may be counted separately. The two limbs are joined



at an angle, the upper being the shorter. When a raker is situated astride the angle, it is included in the lower limb count. When all of the rakers on the arch are counted as a unit, a single number is given; otherwise, both limbs are recorded separately (the upper limb first), and then added, thus $12 + 20 = 32$.

The gill rakers nearest the angle of the arch are the longest; the rakers become progressively shorter as they approach the attachment ends of each arch. The rakers near the ends are often rudimentary and can be counted only under magnification.

It may be difficult to count all of the rakers accurately while the first gill arch is in place, in which case it will be necessary to remove the arch. To do this, turn back or cut away gill cover as shown in Figure 3. Lift the first gill arch up-

ward. With a sharp scalpel, cut between the dorsal ends of the first and second arches, making a deep incision parallel with them; then cut the remainder of the attachment away. Next cut the ventral attachment in the same manner; and when both ends are free, remove the arch. Great care must be taken so that all rudimentary rakers may be removed and counted. After finishing the examination of the arch, reinsert it in the gill chamber for possible future examination.

Gill Raker and Eye Comparison

The longest rakers are compared with the length of the eye (Fig. 4). With dividers, obtain the measurement of the length of the longest raker; then place one point of the dividers at the anterior edge of the eye, the other extending

Figure 2.—First gill arch of salmon after removal from left gill chamber: 1) gill rakers; 2) gill rakers attached to upper or shorter limb of arch; 3) gill rakers attached to lower or longer limb; 4) dorsal end; 5) gill filaments; 6) upper point of arch attachment; 7) lower point of arch attachment.

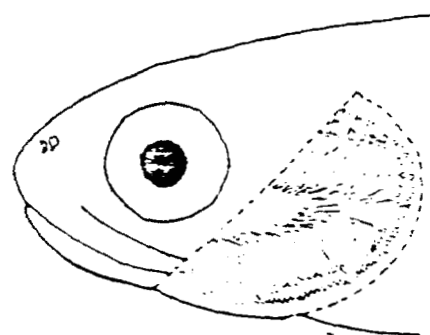
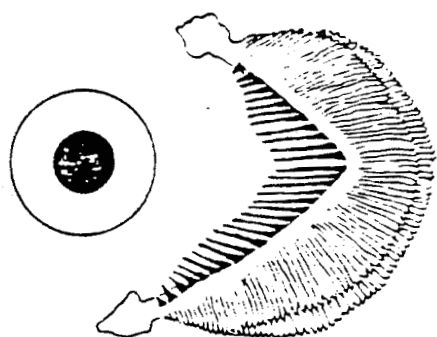
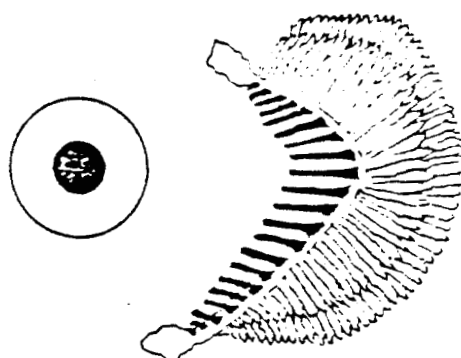


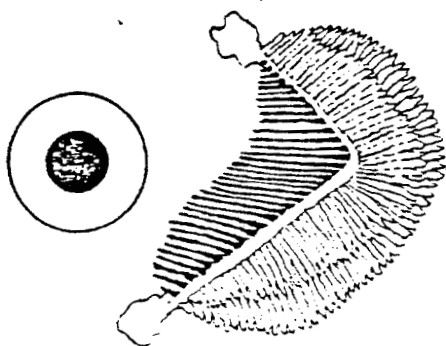
Figure 3.—Head of salmon. Dotted lines indicate that portion of gill cover which has been removed to show first gill arch in place.



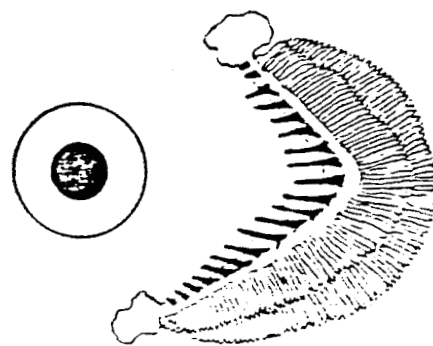
PINK



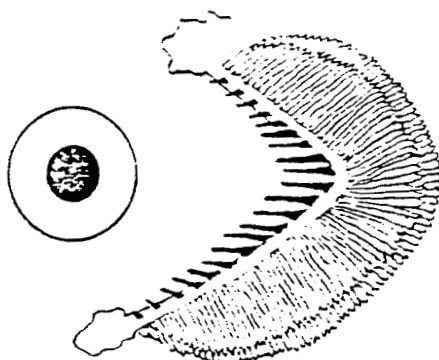
CHUM



SOCKEYE



CHINOOK



COHO

Figure 4. - First gill arch and eye for comparison with longest gill raker length of five species of Pacific salmon.

toward the opposite edge. Because the raker is shorter than the eye length in juvenile salmon, it is simplest to note where the raker reaches in relation to the pupil. Like many body part ratios, the gill raker-eye size ratios change as the juvenile salmon increases in length. For example, in specimens about 40 mm FL, the longest raker may be contained about 3 times the eye length, but in 140 mm specimens of the same species, the raker may be contained only about 2 times. This and other proportional changes must be considered.

Anal Fin Measurement and Count

To compare the length of the fin base with the longest ray, measure the anal fin base with dividers; then project the posterior leg of the dividers forward to the opposite tip of the longest ray as shown in Figure 5 by dotted line.

In counting the number of rays (Fig. 5), do not count those anteriormost ones which are less than half the length of the longest rays, such as those marked "0." Count all rays, such as No. 1, that are half (or more than half) the length of the longest ray, taking great care to observe the last ray—No. 15 in Figure 5. The last ray is usually split to its base and appears superficially as two rays, but it is in reality only one and should be counted as such.

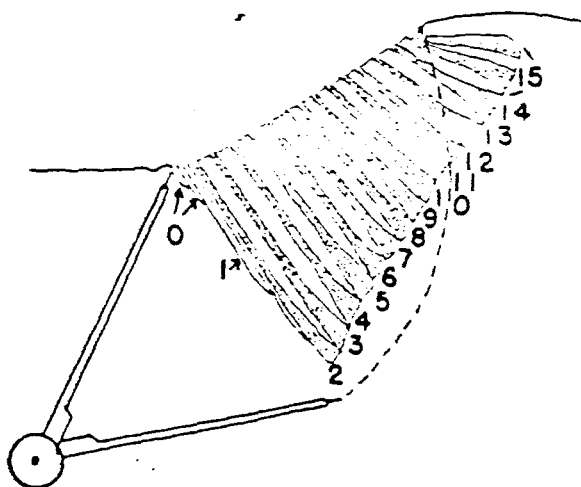


Figure 5. — Anal fin of salmon, illustrating method of measuring length of fin base and of counting rays (rays 2 to 15 are stippled here for emphasis).

Branchiostegal Count

All branchiostegals (Fig. 6), including the smallest, anteriormost ones are counted. Usually this may be accomplished satisfactorily only under magnification and with juveniles longer than 40 mm FL. The branchiostegal count is used primarily as an additional character in specimens otherwise difficult to identify, and is especially valuable in separating the chinook salmon (usually 15 or 16) from the coho salmon (usually 13 or 14).

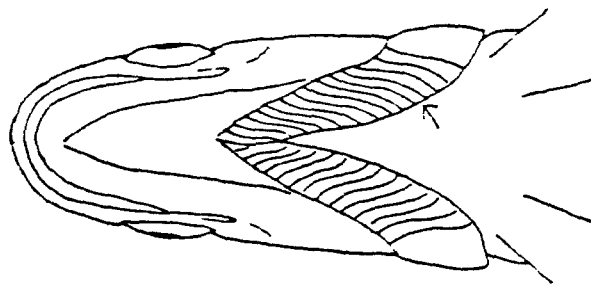


Figure 6. — Ventral surface of head of salmon. Arrow points to one of 14 branchiostegals on left side of head.

Pyloric Caeca Count*

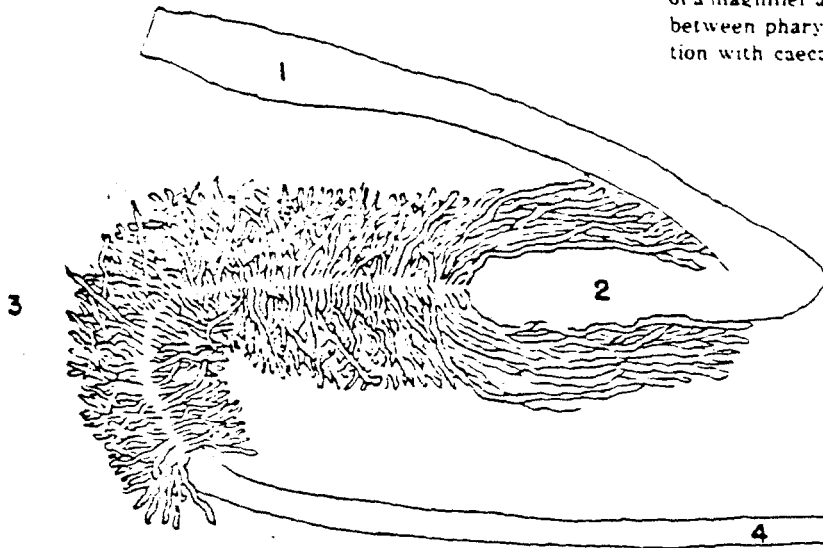
With a scalpel, widely open the abdominal cavity. Sever the esophagus as far forward as possible; then cut off the intestine near the posterior end of the stomach. The stomach and caeca can now be removed as a unit (Fig. 7). Use magnification and teasing needle as aids in counting. Counts of pyloric caeca are useful chiefly as an additional character for questionable specimens, especially in separating the chinook salmon (more than 100 caeca) from the coho salmon (fewer than 90).

Color Pattern Variations

Juvenile salmon from certain waters or at certain stages of development may have their parr marks or other markings masked by a bluish-

*In the key, I have used pyloric caeca counts of my own, plus published accounts of others and especially the more recent ones, such as Clemens and Wilby (1961) and McPhail and Lindsey (1970).

Figure 7. — Major portion of alimentary tract of salmon with pyloric caeca spread apart preparatory to counting with aid of a magnifier and teasing needle: 1) esophagus (part of tract between pharynx and stomach), 2) stomach, 3) pyloric section with caeca, 4) intestine.



or greenish-silvery sheen, especially when they are alive. To identify these fish, it may be necessary to preserve them first in Formalin to intensify their markings.

Juveniles of one species from certain waters, such as habitually turbid ones, may have their melanophores restricted in size or distribution, thereby resembling superficially another species. As an example, coho salmon normally have the adipose and anal fins densely speckled with rather large melanophores. But in some specimens, the melanophores may be reduced in size or distribution, so that coho salmon superficially resemble chinook salmon. Conversely, juvenile chinook salmon may have the melanophores unusually numerous and well developed, thereby resembling coho salmon. To avoid error in identification, compare the size and number of melanophores on the fins with those on the body; if few and small on the body, they should be few and small on the fins.

Color variations also occur regionally. An example is the predorsal stripe in chinook salmon, which in fish from some waters is normally a solid dark bar in specimens less than 80 mm FL; in chinook salmon in other waters the stripe may be reduced to a series of oblong blotches.

The length when individuals attain smolt coloration varies greatly, both regionally and in specimens from the same locality; some fish of

the same species may lose parr and other presmolt markings when only half as large as other fish.

HOW TO USE KEY

Because of the variations in morphology and coloring, it is advisable to use the key in conjunction with the figures and plates and to check a large combination of characters.

In using the key, first make certain your specimen is a Pacific salmon by examining the characters under the two opposable groups labeled "1." Next, note the absence or presence of parr marks (see sections "Combination of" under opposable groups 2). If no parr marks are present and your specimen has not entered the silvery smolt stage, it is probably a pink salmon, but to make sure, compare it with the identifying characters between opposable groups 2. If parr marks are present, note the absence or presence of melanophores on adipose and anal fins (see groups 3). If melanophores are absent, see sections "Combination of" under groups 4; if present, see "Combination of" sections under groups 5. Decide which "Combination of" most closely fits your specimen, then verify it by comparing the descriptions of the identifying characters for the opposable groups.

KEY TO PRESMOLT JUVENILE SALMON

- Salmonoid fishes having fewer than 20 rays in the dorsal fin (excludes grayling); strong teeth on jaws and tongue (excludes ciscoes and whitefishes); many pyloric caeca (excludes smelts, family Osmeridae); an axillary process or scaly appendage above pelvic fin (Fig. 1, No. 14); an adipose fin; cycloid scales; upper jaw formed by both premaxillary and maxillary1.
- 1a Base of anal fin *shorter* than longest ray (Fig. 5). Anal rays usually 9 to 12 (rarely 8 or 13). Gill rakers normally fewer than 20 on first gill arch (Fig. 3). Dorsal fin of larger juveniles of some species with several blackish spots.
CHAR. TROUTS, ATLANTIC SALMON.Not in this key.
- 1b Base of anal fin *longer* than longest ray (Fig. 5). Anal rays usually 13 to 17 (rarely 12, 18, or 19). Gill rakers normally 20 to 40 on first gill arch (rarely 19). Dorsal fin of larger juveniles lack blackish spots but tip of fin may be blackish.
PACIFIC SALMON—genus *Oncorhynchus*.2.
- 2a *Combination of: No parr marks on sides and no prominent specklings on back of presmolt juveniles. Usually no melanophores on anal and adipose fins; if melanophores present, they are few and very small, and if on adipose, are restricted to its posterior, free edge.*
PINK (HUMPBACK) SALMON—*O. gorbuscha*.Plate 1.
- General development—Similar to chum salmon in that yolk sac may not disappear until juvenile is more than 34 mm FL, after which development toward smolt shape and coloration is rapid. When less than 50 mm FL, this species is similar to chum salmon in being more terete than the sockeye, chinook, and coho salmon; body depth immediately before dorsal fin usually more than 1.5 times head length.
- Parr marks—Only species of salmon lacking parr marks in the presmolt juvenile.
- Coloration of body—*Preserved material*—In juveniles less than 40 mm FL, back is dark to lateral line and ventral half of body light when bicolor; dorsal third of body is darkest, sides lighter, ventral third lightest (usually milky-white or silvery) when tricolored. Few or no melanophores on lower sides and belly. In juveniles more than 40 mm FL, bicolor or tricolored condition is normally not evident, the dark back lightening gradually downward to the very light belly. *Living specimens*—Dorsal half of body bright bluish or greenish with much silvery reflection; ventral half milky or silvery-white.
- Fins—Anal and dorsal fins averaging smaller than in chum salmon; these fins in this species and in chum salmon distinctly smaller than in sockeye, chinook, or coho salmon. In specimens less than 40 mm FL the longest anal ray, when measured into head length, extends from tip of snout to about center of eye; in larger presmolt juveniles, this measurement extends from tip of snout to anterior half of eye. Anal rays usually 14 to 16 (extremes 13 to 17). *Dorsal fin* has few specklings and only a slight tendency toward a dark anterior edge in juveniles less than 50 mm FL; over 50 mm, blackish anterior edge becomes pronounced and tip of fin dusky. *Caudal fin* has speckling confined to basal half in juveniles less than 50 mm; with increasing length of juveniles, specklings appear along rays, and in large presmolt juveniles lobes tend to become blackish.

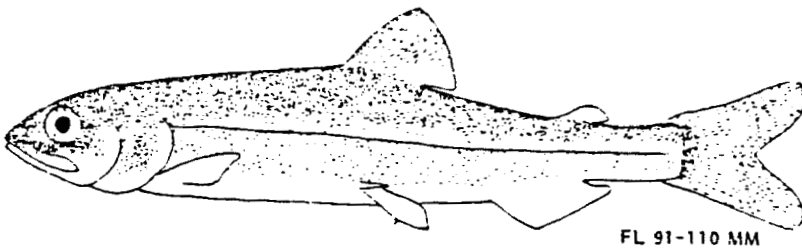
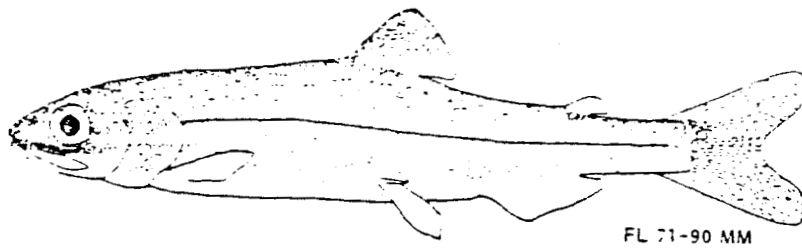
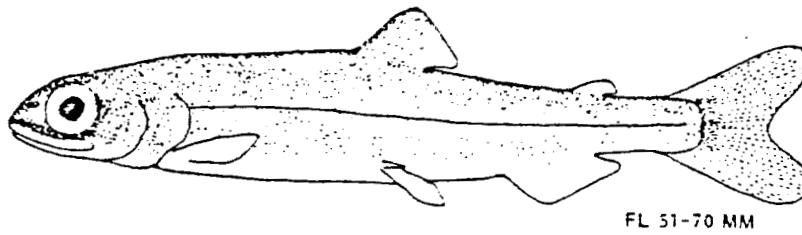
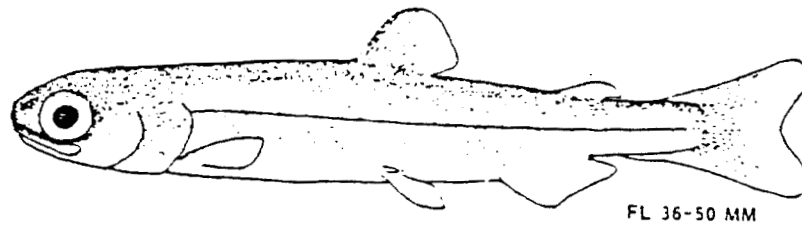
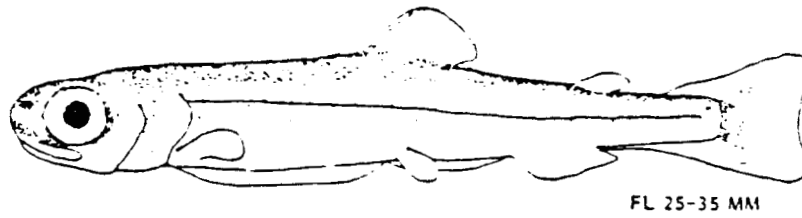


Plate 1.—Pink salmon.

Gill rakers (see Fig. 4) — Eleven to fourteen on upper limb, 14 to 19 on lower, total usually ranging between 27 and 33 (extremes 25 and 35); rakers slender and rather long; most similar in size and number to sockeye salmon but shorter and usually fewer (normally less than 31).

Pyloric caeca — Usually 130 to 195 (extremes 95 to 224); slender and rather long; differ sufficiently in numbers from coho and sockeye salmon, which have fewer than 100, to be a distinct aid in specific identification.

Branchiostegal rays — Usually 11 to 14 (rarely 10 or 15); average number less than in other species, almost invariably less than in chinook salmon, which usually has 15 to 18 (rarely 14).

Scales in lateral line — More than 170, more than in any other of the Pacific salmon; lateral line scale counts may be obtained under magnification in specimens longer than 60 mm FL.

Habits — Shortest life span of any species, between 18 mo and 2 yr. Only a comparatively small proportion of adults make extended migration in fresh water. Majority spawn in fresh waters within a short distance of brackish water or in intertidal waters. Many young enter brackish or salt waters within a few hours or days after emerging from redds, and comparatively few are found in fresh water when more than 45 mm FL.

2b *Combination of:* Both parr marks on sides and dark spottings on back usually obvious in living, presmolt juveniles and always in preserved specimens under magnification (may be faint in fishes from turbid waters); parr marks become faint and disappear as juvenile assumes smolt coloration 3.

3a No melanophores normally present on adipose and anal fins of presmolt juveniles, or if present, few and quite small. Parr marks occupy a larger area above lateral line than below it, and in some specimens anterior parr marks may be almost entirely above the lateral line.

CHUM AND SOCKEYE SALMON 4.

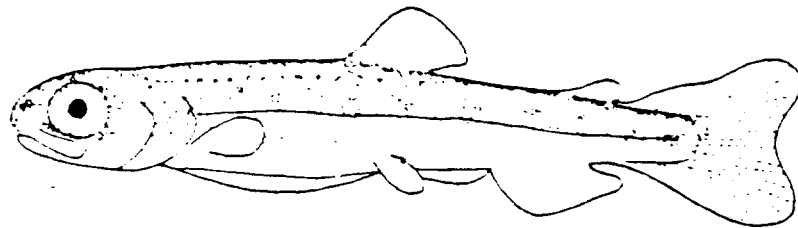
3b Melanophores normally obvious on adipose fin in living specimens and always in preserved specimens under magnification (may be indistinct in juveniles from silty waters). Anteriormost parr marks appear to occupy as large (or almost as large) an area below lateral line as above it; these parr marks are usually large, long, and wide.

CHINOOK AND COHO SALMON 5.

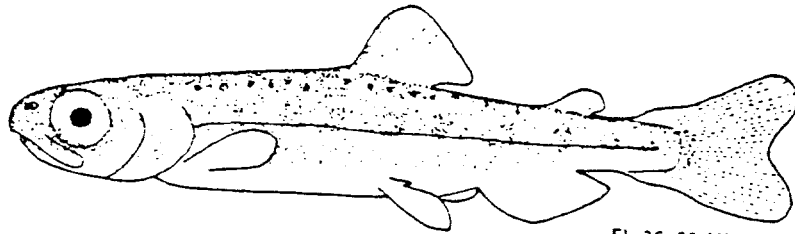
4a *Combination of:* Gill rakers 19 to 26 (average 23), notably fewer and much shorter than in sockeye salmon, which have more than 28. Normally no melanophores on adipose and anal fins. Anterior squarish (quadrated) parr marks situated almost or entirely above lateral line in specimens less than 50 mm FL; in presmolt juveniles more than 50 mm FL, anterior parr marks tend to be long and very narrow and sometimes may extend well below lateral line.

CHUM (DOG) SALMON — *O. keta* Plate 2.

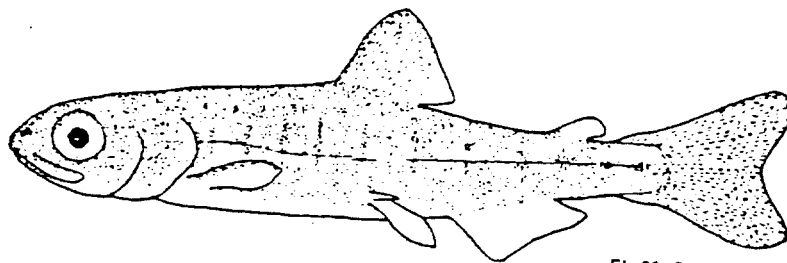
General development — Similar to pink salmon in that yolk sac may not disappear until juvenile is more than 34 mm FL, after which development toward smolt shape is rapid. Also similar to pink salmon in being more terete (when less than 50 mm FL) than the sockeye, chinook, and coho salmon; body depth immediately before dorsal fin usually 1.5 to 1.8 times head length.



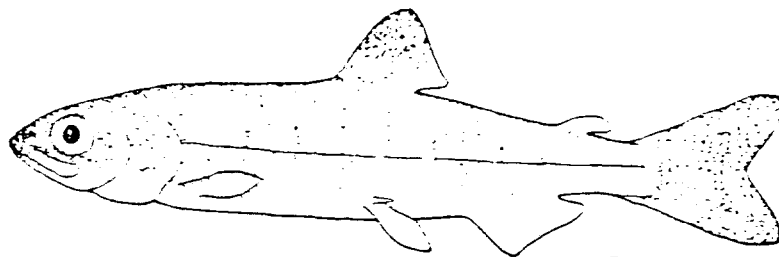
FL 25-35 MM



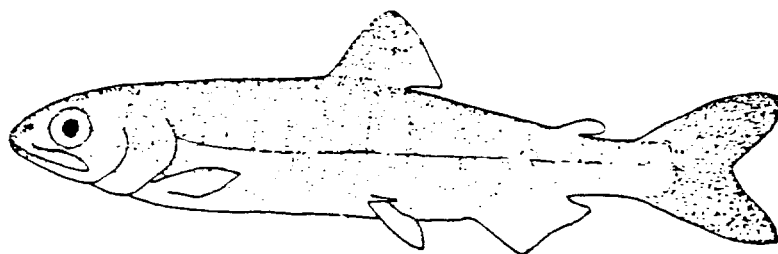
FL 36-50 MM



FL 51-70 MM



FL 71-90 MM



FL 91-110 MM

Plate 2. — Chum salmon.

Parr marks—Anterior parr marks in specimens less than 50 mm FL are more squarish (quadrate) and do not extend quite so far below lateral line as in sockeye salmon; in presmolt juveniles more than 50 mm FL, parr marks tend to become longer and more narrow than in sockeye salmon, and some tend to extend well below lateral line.

Coloration of body—*Preserved material*—Dorsal ridge stripe usually present, sometimes a series of blotches in juveniles less than 50 mm FL, becoming faint or disappearing in presmolt juveniles more than 50 mm FL; a prominent irregular row of spots and blotchings between dorsal ridge and upper edge of parr marks, these usually most distinct in specimens between 34 and 50 mm, often fading or disappearing in larger juveniles. *Living specimens*—Markings may be obscured by greenish or bluish overcast of dorsal half of body and whitish or silverish sheen of ventral half.

Fins—Anal and dorsal fins small, averaging slightly larger in size than those of pink salmon and averaging considerably smaller in height and area than those of sockeye salmon. Length of longest anal ray, when measured from snout to eye, reaches to, or almost to, center of eye; in sockeye salmon this measurement usually extends well beyond center of eye. Anal rays usually 13 or 14 (extremes 13 to 17). *Dorsal fin* has few or no distinct spottings in specimens less than 50 mm FL; in larger presmolt juveniles a dusky spot develops on tip. *Caudal fin* has faint spots largely confined to basal half in juveniles less than 50 mm FL; in larger juveniles lobes become blackish.

Gill rakers (see Fig. 4)—Seven to twelve on upper limb, 12 to 19 on lower, total usually ranging between 20 and 26 (extremes 19 to 30); rakers blunt and short, in sharp contrast to thinner, longer, and more numerous rakers of sockeye salmon, which has 30 to 39.

Pyloric caeca—Usually 160 to 185 (extremes 140 to 240); differ sufficiently in numbers from sockeye and coho salmon, which usually have fewer than 100, to be an aid in specific identification.

Branchiostegal rays—Usually 13 or 14 (extremes 12 to 16); of value primarily in separating this species from chinook salmon, which generally has more than 15.

Scales in lateral line—Between 125 and 155; of value chiefly in separating this species from pink salmon.

Habits—Life span usually 3 to 5 yr, for majority, 4 yr, some less than 3 yr. Jacks may occur. Majority spawn in fresh waters only a comparatively short distance from brackish water or in intertidal waters. Many young enter brackish or salt waters very shortly after emerging from redd, and few juveniles are found in fresh waters when more than 45 mm FL.

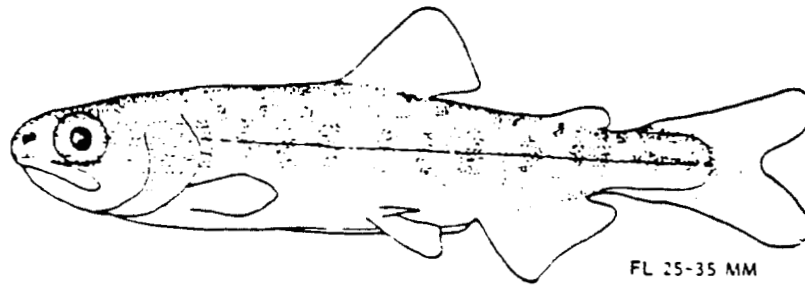
Combination of: Gill rakers 30 to 39 (average 36); notably more numerous, longer, and more slender than in chum salmon, which have fewer than 27. Normally no melanophores on adipose and anal fins. Anterior parr marks more rectangular than squarish in outline in specimens less than 45 mm FL and sometimes extend as much as a third to a half below lateral line; these oblong parr marks tend to shorten in presmolt juveniles more than 50 mm FL and to be mostly above lateral line.

4b

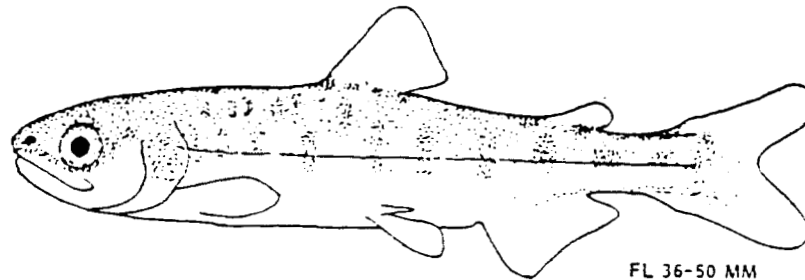
SOCKEYE (RED) SALMON—*O. nerka*. Plate 3.

General development—Yolk sac usually disappears, except for trace, before juveniles reach 30 mm FL. Body deeper and species more slab-sided in all presmolt lengths than in chum and pink salmon—body depth immediately before dorsal fin usually less than 1.5 times head length.

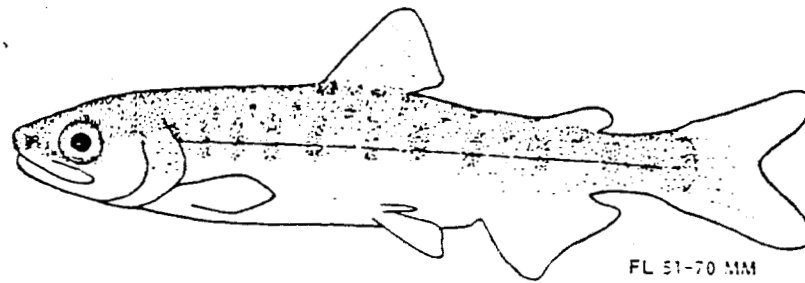
Parr marks—See "*Combination of*" above.



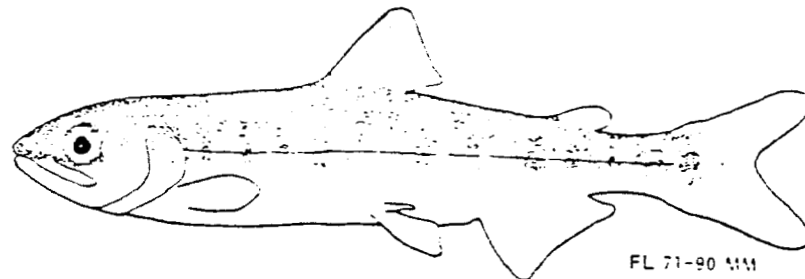
FL 25-35 MM



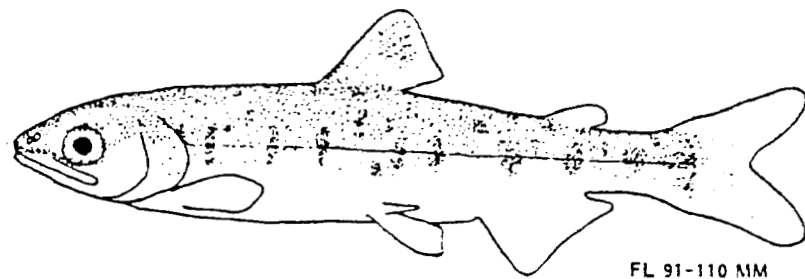
FL 36-50 MM



FL 51-70 MM



FL 71-90 MM



FL 91-110 MM

Plate 3. — Sockeye salmon.

Coloration of body—*Preserved material*—Dorsal ridge usually contains a series of more or less distinct spots in specimens less than 35 mm FL, becoming more confluent in fishes between 40 and 55 mm FL and sometimes merging into a dusky bar; in presmolt juveniles over 60 mm FL, spots or bars may disappear, after which a series of roundish spots become apparent on both sides of, and adjacent to, dorsal ridge, especially that portion behind dorsal fin; in addition to these spots, in fishes more than 35 mm FL, another longitudinal row of spots develops between dorsal ridge and upper halves of parr marks. *Living specimens*—Markings may be obscured by greenish or bluish overcast of dorsal half of body and whitish or silverish sheen of ventral half.

Fins—Anal and dorsal fins average larger in height and area than in chum and pink salmon. Length of longest anal ray, when measured from snout to eye, reaches usually from snout to beyond center of eye. Anal rays usually 14 to 16 (extremes 13 to 16). *Dorsal fin* normally has few or no distinct specklings in specimens less than 60 mm FL; a rather faint dorsal spot develops in larger presmolt juveniles in upper portion of fin, the fin being bordered on its free edges with whitish (see lowest figure, Plate 3). *Caudal fin* has few specklings on basal half, the lobes having few or no melanophores, even in rather large juveniles.

Gill rakers (see Fig. 4)—Twelve to sixteen on upper limb, 18 to 23 on lower, total usually ranging between 32 and 37 (extremes 30 to 39); rakers long and slender, averaging longer than in any other species, in sharp contrast to fewer, blunter rakers of chum salmon, which has 19 to 30.

Pyloric caeca—Usually 65 to 95 (extremes 45 to 115); usually considerably fewer than in pink, chum, and chinook salmon, and averaging more than in coho salmon.

Branchiostegal rays—Usually 13 to 15 (extremes 11 to 16); of value chiefly in separating this species from chinook salmon, which average more.

Scales in lateral line—Between 125 and 140; of value chiefly in separating this species from pink salmon, which has a higher number.

Habits—Life span usually 4 or 5 yr, some only 3. Jacks may occur. Majority of individuals highly migratory. Adults usually spawn in streams tributary to lakes; a small minority spawn in streams without a lake, in lake outlets, or on lake beaches. After rising from redd, young move downstream rather rapidly to a lake, remaining usually 1, sometimes 2, and rarely 3 yr in fresh water before entering brackish or salt water.

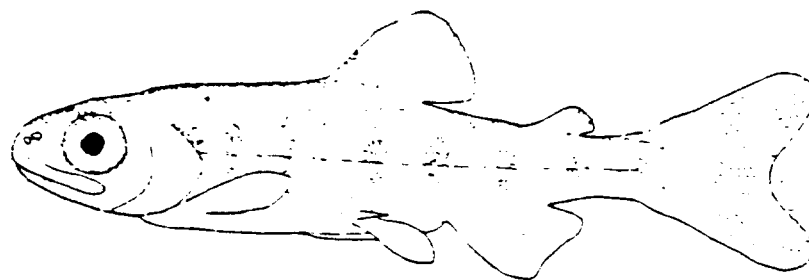
Combination of: Melanophores on adipose fin usually most numerous on posterior half and generally forming a dark border (see Plate 4); anterior half of adipose with few melanophores or none. Anal fin with few melanophores or none, but when melanophores are present, often quite large. Tip of dorsal fin and lobes of caudal fin darker in larger presmolt juveniles.

5a

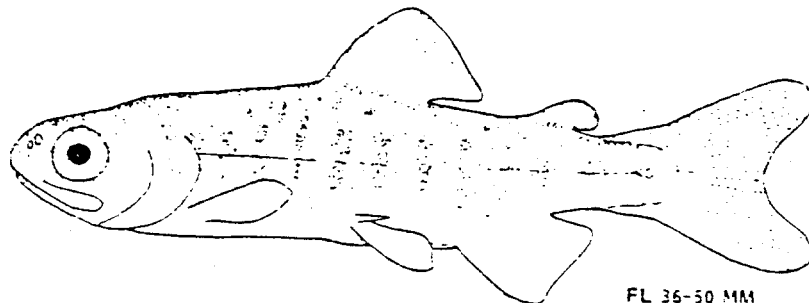
CHINOOK (KING) SALMON—*O. tshawytscha*. Plate 4.

General development—Yolk sac usually disappears or is reduced to a trace before juveniles reach 32 mm FL. Body deeper and species more slab-sided in all presmolt lengths than in chum and pink salmon; body depth immediately before dorsal fin usually less than 1.5 times head length (range 1.1 to 1.5).

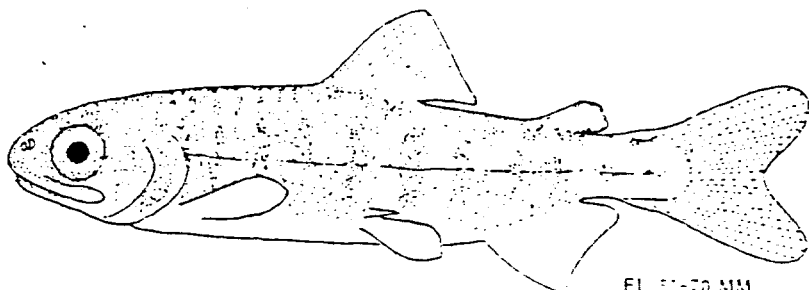
Parr marks—Almost invariably rectangular and long vertically; marks usually situated equidistant on each side of lateral line; dark parr marks and other markings contrast sharply with lighter background of body in some living and most preserved specimens.



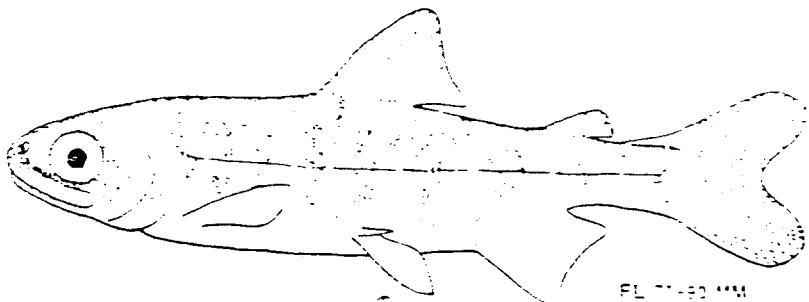
FL 25-35 MM



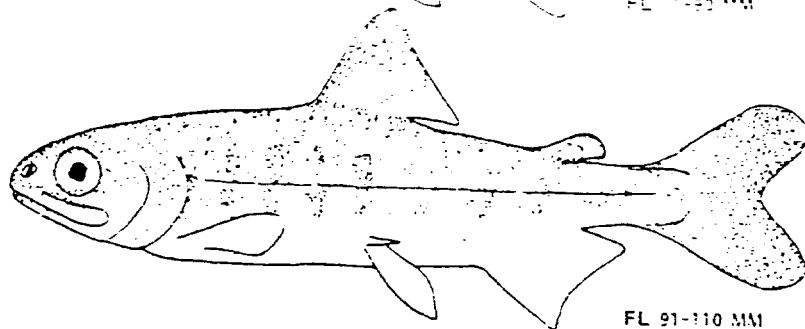
FL 36-50 MM



FL 51-70 MM



FL 71-90 MM



FL 91-110 MM

Plate 4. — Chinook salmon.

Coloration of body—*Preserved material*—Background color of body generally much lighter than body color of coho salmon, usually contrasting sharply with dark dorsal stripe or spotting, parr marks, and prominent dorsal spottings; blackish band astride dorsal ridge usually bold and unbroken in specimens less than 80 mm FL and especially on ridge before dorsal fin; in larger juveniles dorsal band often breaks up into series of spots, disappearing in larger pre-smolts as other spottings on dorsal half of body become more numerous and distinct; spottings between dorsal ridge and parr marks absent in fishes less than 35 mm FL, developing rapidly thereafter into many large and small spots and increasing in numbers as juveniles approach smolt stage. *Living specimens*—Parr marks and other markings may be obscured by bluish-silvery color of dorsal half of body and silvery sheen of ventral half.

Fins—Anal and dorsal fins averaging considerably larger in area than those of the chum and pink salmon and slightly larger than in the sockeye salmon; length of longest anal rays, when measured into head length, reaching from snout tip to beyond posterior edge of pupil and sometimes beyond posterior edge of eye; distal edge of anal slightly falcate in specimens more than 40 mm FL but averaging less falcate than does the free edge of the anal of the coho salmon. Anal rays 15 to 19, averaging higher in number than in any other species. *Dorsal fin* in young less than 60 mm FL usually has few or no distinct spottings, a blackish spot developing in the upper portion of the fin as the juveniles approach the smolt stage (see Plate 4). *Caudal fin* has comparatively few melanophores rather generally distributed in the smaller individuals, the lobes darkening as the fishes approach the presmolt stage.

Gill rakers (see Fig. 4)—Seven to twelve on upper limb, 10 to 16 on lower, total usually ranging between 20 and 25 (extremes 19 to 28); rakers short and similar in size and number to chum and coho salmon.

Pyloric caeca—Usually 140 to 185 (extremes 90 to 240); of value in separating this species from coho salmon, which normally has fewer than 85.

Branchiostegal rays—Usually 16 to 18 (extremes 13 to 21); average number greater than in any other species.

Scales in lateral line—Between 122 and 152; usually of most value in separating this species from pink salmon.

Habits—Life span 2 to 8 yr, usually 4 to 6. Jacks may occur. A portion of the juveniles enter salt water during first year of life; remainder stay in fresh waters more than 1 yr but rarely 2 yr. Juveniles of presmolt stage found in fresh waters when as long as 150 mm FL.

Combination of: Melanophores usually numerous and rather evenly distributed on adipose fin; occasionally in larger juveniles, posterior or free edge may be darker than remainder, thereby resembling somewhat melanophore distribution on adipose of chinook salmon. Anal fin in specimens larger than 30 mm FL more falcate and anterior tip more pronounced than in other species, including chinook salmon; in all except smallest specimens, anterior or leading edge of anal fin is whitish, with a dark bar parallel and posterior to it; remaining, posterior portion of fin usually abundantly speckled with melanophores except for distal and posterior edges (see Plate 5).

COHO (SILVER) SALMON—*O. kisutch*. Plate 5.

General development—Yolk sac usually disappears, except for a trace, before juveniles reach 32 mm FL. Body deeper and species more slab-sided in all pre-

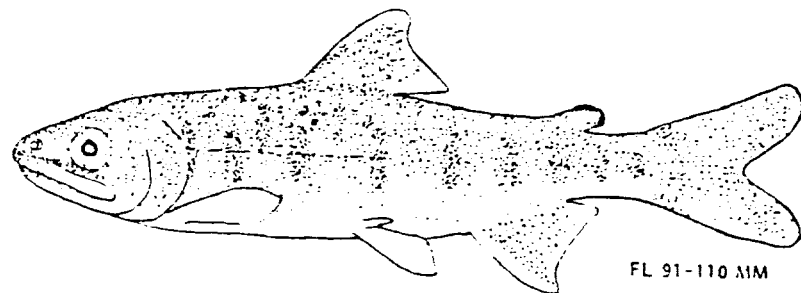
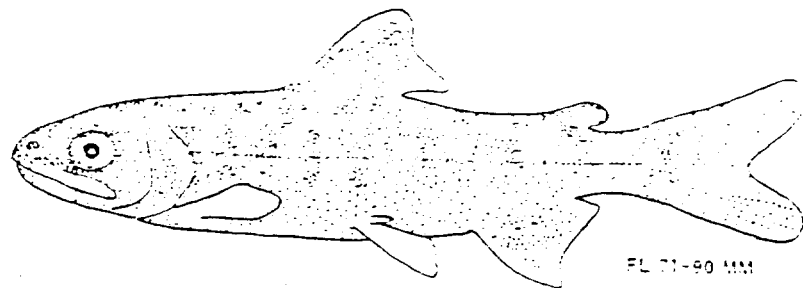
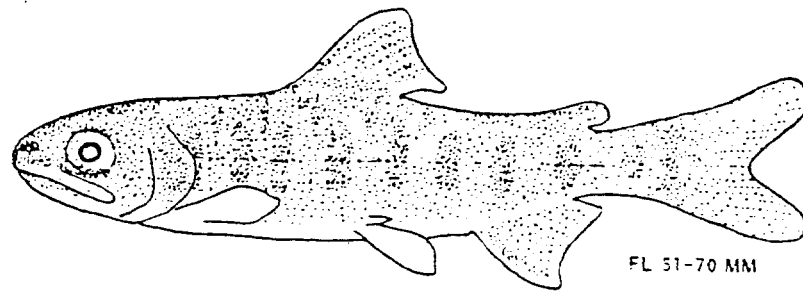
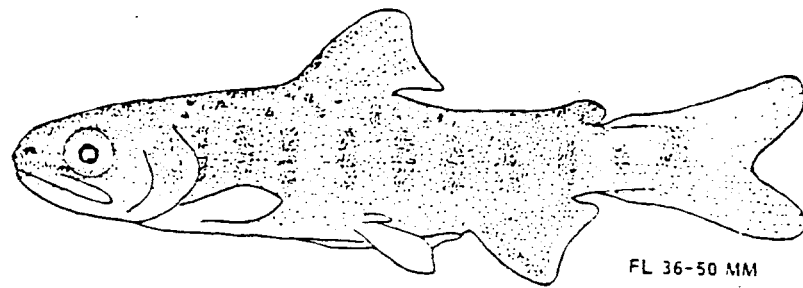
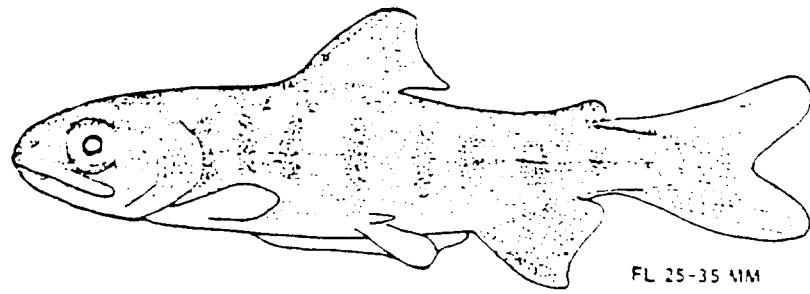


Plate 5. — Coho salmon.

smolt lengths than in chum and pink salmon; body depth immediately before dorsal fin usually less than 1.5 times head length (range 0.9 to 1.5).

Parr marks—Anterior parr marks always large and long vertically, their upper and lower ends more rounded than rectangular-shaped parr marks of chinook salmon; marks usually situated equidistant on each side of lateral line; usually less contrast between color of parr marks and body than in chinook salmon.

Coloration of body—*Preserved material*—In all but smallest specimens, contrast between all body marks and background color of body is not as pronounced as in other species; dark bar along dorsal ridge usually distinct and unbroken in juveniles less than 50 mm FL, breaking up into spots or disappearing in larger specimens; back spottings on both sides of dorsal ridge usually prominent in all except smallest specimens; spots between parr marks often elongate and extending downward between them, sometimes to lateral line (see bottom figure, Plate 5); spots on dorsal half of body often increase in number and/or decrease in size as individuals approach smolt stage. *Living specimens*—Parr marks and other body markings may be obscured by dark coloration of body or by bluish sheen.

Fins—Anal and adipose fins described under "Combination of" (this section). Anal rays usually 13 or 14 (extremes 13 to 16). *Dorsal fin* has comparatively few melanophores scattered over it in smallest specimens; in those more than 32 mm FL the number of melanophores increases, especially on or adjacent to anterior or leading edge; this results in a dark bar along the anterior edge behind which melanophores are rather evenly distributed; as fishes approach presmolt stage, a white anterior (or leading) edge and a whitish tip develops, followed by a dark parallel bar (see bottom figure, Plate 5). *Caudal fin* has rather even distribution of melanophores along rays in all except smallest young, this increasing in color intensity and number as fish increases in size.

Gill rakers (see Fig. 4)—Eight to thirteen on upper limb, 9 to 14 on lower, total number usually ranging between 19 and 27 (extremes 18 to 27); rakers short and rather similar in size and number to chum and chinook salmon.

Pyloric caeca—Usually 50 to 85 (extremes 45 to 114); of value in separating this species from chinook, pink, and chum salmon, which normally have more than 100.

Branchiostegal rays—Usually 13 or 14 (extremes 12 to 15); average number less than in chinook salmon, which normally has 15 or more.

Scales in lateral line—Between 120 and 140 (average 128); usually averaging fewer than in any other species.

Habits—Life span 2 to 4 yr. Jacks may occur. Majority appear to spend 1 or 2 yr in fresh waters, a few 3 yr. Some juveniles in presmolt stage are found in fresh waters when 150 mm FL.

GLOSSARY

Adipose fin A fleshy, finlike, rayless structure situated on dorsal ridge between dorsal and caudal fins (Fig. 1, No. 6).

Anal fin The fin situated medially and immediately behind vent between posterior end of abdomen and anterior end of caudal peduncle (Fig. 1, No. 16).

Axillary process or scale An accessory enlarged scale attached to upper or anterior base of pelvic fin (Fig. 1, No. 14).

Gill opening Opening between opercle or gill cover and side of head.

Branchiostegals or branchiostegal rays Elongated bones arranged fanwise within branchiostegal membranes, situated on ventral edge of gill covers (Fig. 6).

Caudal fin Terminal or tail fin of fishes (Fig. 1, No. 12).

Caudal peduncle That region of body between base of posterior ray of anal fin and base of caudal fin (Fig. 1, No. 11).

Chromatophores Color cells which under control of sympathetic nervous system can be altered in shape, producing color changes.

Cycloid scales Smooth-edged scales of soft-rayed fishes having an evenly curved posterior border devoid of minute spines.

Dorsal fin In salmon, a single fin composed of rays situated dorsally on body approximately halfway between head and tail (Fig. 1, No. 4).

Dorsal ridge Apex or dorsal junction of left and right sides of body; dorsal and adipose fins are situated on this ridge (Fig. 1, No. 3-6).

Dorsal stripe A band on dorsal ridge which is lighter or darker than adjacent areas.

Falcate Curved like a sickle; a fin is falcate when its distal edge is concave, having middle rays shorter than anterior and usually posterior rays.

Filaments See *gill filaments*.

Fork length Distance in a straight line from anteriormost part of tip of upper jaw or snout of juvenile salmon to apex of angle produced by two lobes of caudal fin (Fig. 1, No. 1).

Gill arch Branchial skeleton which contains gill rakers and gill filaments, or lamellae (Fig. 2).

Gill cover, opercle, or operculum Large, very flat, thin bones on each side of head which

cover gills (see Fig. 3, which has the major portion of the gill cover removed).

Gill filaments (lamellae) Pleated folds of skin, richly supplied with blood vessels, attached to posterior edge of gill arch (Fig. 2, No. 5).

Gill rakers Projections on anterior edge of first gill arch (Fig. 2, No. 1).

Head length Distance in a straight line from anteriormost part of upper jaw or snout to posterior margin of opercle (Fig. 1, No. 2).

Hypural Complex of expanded and fused bones of last few vertebrae which support caudal fins in certain fishes.

Jack Precocious male salmon which spawn after spending a year or two less in the ocean than the majority of individuals; they are notably smaller than average size of spawning males of their species.

Juvenile As used here, a salmon between 25 and 110 mm FL which has not entered smolt stage.

Lamellae See *gill filaments*.

Lateral line A line formed by a series of sensory tubes and pores extending along sides from head to tail (Fig. 1, No. 10).

Lateral line scale count A count of pored scales from first scale on body behind head posteriorly to above hypural.

Melanophores Chromatophores with dark or black pigment.

Parr marks Squarish or oblong blotches or pigmented areas along sides of presmolt salmonids (Fig. 1, No. 9).

Pectoral fins Anterior or uppermost of paired fins of fishes, one on each side of breast immediately behind head (Fig. 1, No. 13).

Pelvic fins A ventral pair of fins, abdominal in salmonids (Fig. 1, No. 15).

Postdorsal ridge That portion of dorsal ridge behind dorsal fin (Fig. 1, No. 5).

Predorsal ridge That portion of dorsal ridge before dorsal fin (Fig. 1, No. 3).

Presmolt A juvenile salmon with parr marks; in pink salmon, which lack parr marks, demarcation between a presmolt and smolt is slight, differing chiefly in latter's more adult shape.

Pupil of eye Opening in iris of eye by which light reaches retina. It is circular in fishes (Fig. 1, No. 7).

Pyloric caeca Fingerlike diverticula, usually glandular, which open into alimentary canal

of most fishes at junction of stomach and intestine in region of pylorus (Fig. 7, No. 3).

Rakers See *gill rakers*.

Redd Excavation or nest made by a spawning salmon.

Rudimentary Very small and poorly formed, pertaining here chiefly to smallest gill rakers and anal rays (Fig. 5, "0").

Slab-sided When depth of body, measured before dorsal fin, is considerably greater than width of body.

Smolt As used here, a young salmon which has lost its parr marks. Pink and chum salmon fry usually go to the ocean within a few days of emerging from the streambed and usually do not undergo a visible change in morphology or color in fresh water.

Subadult An individual similar to an adult and approaching adulthood in age and size but still incapable of breeding.

Terete Nearly cylindrical in cross section and tapering toward the front and rear.

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National Oceanic and Atmospheric Administration
National Marine Fisheries Service

Key to Field Identification of Anadromous Juvenile Salmonids in the Pacific Northwest

ROBERT J. McCONNELL and GEORGE R. SNYDER

SEATTLE, WA.
January 1972

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○ Key to Field Identification of Anadromous Juvenile Salmonids in the Pacific Northwest

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ABSTRACT

A key is presented with descriptive illustrations to help in field identification of live, juvenile salmonids in fresh waters of the Pacific Northwest. Other juvenile fish that may be mistakenly identified as salmonids are included.

INTRODUCTION

○ Species identification of live, anadromous juvenile salmonids is frequently a problem to the field biologist. The purpose of this key is to list and illustrate the external characteristics which will expedite field identification of juvenile salmonids in the Pacific Northwest.

Five species of Pacific salmon (pink, chum, sockeye, chinook, and coho); four species of trout (cutthroat, brown, Dolly Varden, and rainbow or steelhead); and other juvenile and adult fish¹ that may be mistaken for salmon or trout in fresh water are described in this key.

USE OF KEY

The characteristics for identification are listed in a series of alternative statements, some of which are illustrated. To use the key, examine the first statement; if applicable, proceed to the next and continue to successive statements until the species is identified. If a statement is not applicable, pass to the alter-

native characteristics indicated by numbers in parentheses (numbers on the drawings correspond to numbers of statements in the key). Continue in this manner until the specimen is identified. Some external characteristics are positive separating features (marked with asterisk), whereas others are not. Therefore, two or more statements should be considered before final rejection. If a precise identification cannot be made using the external characteristics—and the fish can be sacrificed, a positive identification can usually be made from internal features (marked with double asterisks). A bibliography of keys that utilize more descriptive internal characteristics is included in this paper.

KEY

1. (47) Adipose fin and scales present.
(Fig. 1)
2. (48) Fleshy appendage at base of pelvic fins present.
3. (49) Mouth large, reaching at least to center of eye.

Family Salmonidae

¹ Especially adult smelt, family Osmeridae.

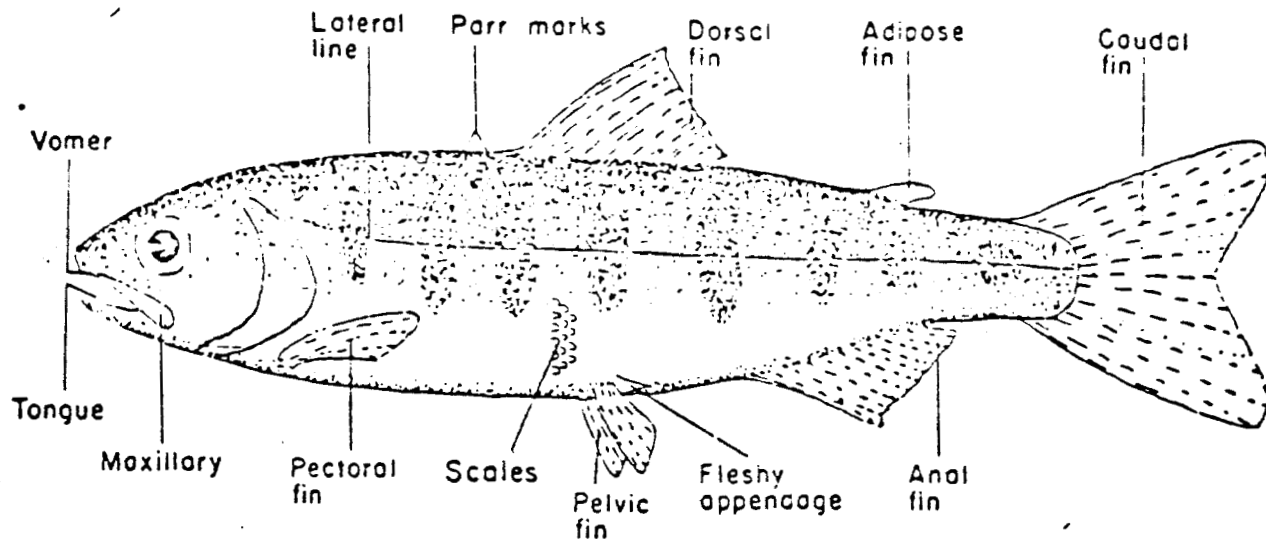


Figure 1.—A hypothetical salmonid showing external characteristics.

4. (17) Anal fin higher than long, with 8 to 12 developed rays (Fig. 2A)
5. (52) *Teeth on head and shaft of vomer. (Fig. 3A)

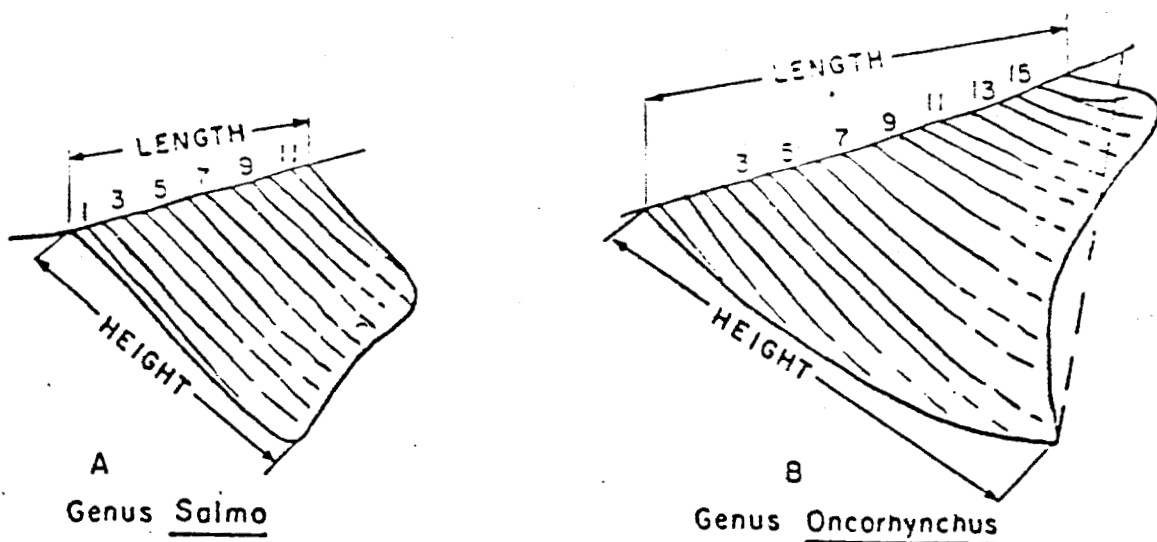


Figure 2.—Anal fins: (A) Trout, genus *Salmo*; (B) Pacific salmon, genus *Oncorhynchus*. The two drawings show differences in structure and fin ray count. (Note that the length of the anal fin is its overall basal length, and its height is that distance from the origin of the fin to the tip of the anterior lobe. In counting fin rays, include only those which originate from the base and terminate at the outer margin of the fin or are half as long as [or greater than] the longest ray.)

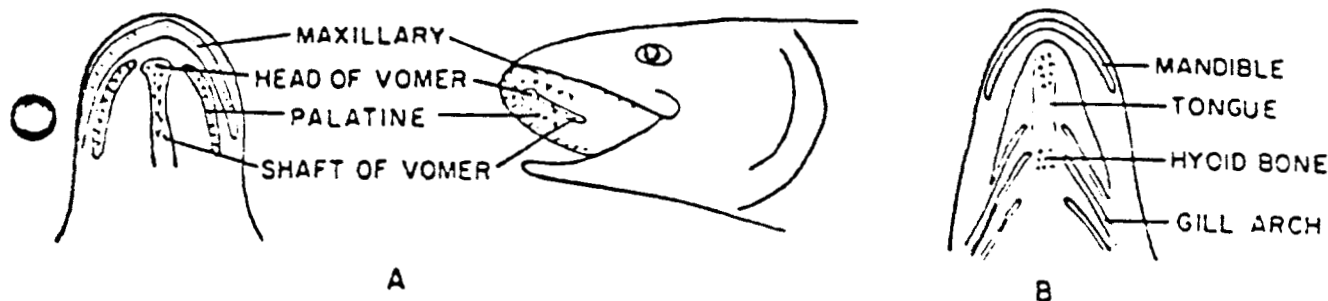


Figure 3.—Location of dentition in (A) the roof and (B) the floor of the mouth of salmonid fishes. (Presence or absence of teeth on the vomer or tongue may be determined by use of the little finger or a blunt instrument. The small hyoid teeth at the base of the tongue are located between the gill arches of the lower jaw and are difficult to find.)

6. (18) Dorsal fin with large dark spots.

Trout
Genus *Salmo*

7. (53) Adipose fin not orange; no row of pale round spots along lateral line.

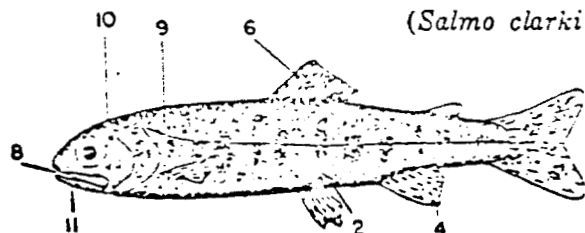
8. (12) *Small hyoid teeth at base of tongue. (Fig. 3B)

9. (13) Not more than five parr marks on mid-dorsal ahead of dorsal fin.

10. (14) Maxillary reaching past posterior margin of eye.

11. (15) Red or yellowish hyoid mark under lower jaw. Tail usually black spotted.

Cutthroat trout
(*Salmo clarki*)



12. (8) *No teeth at base of tongue.

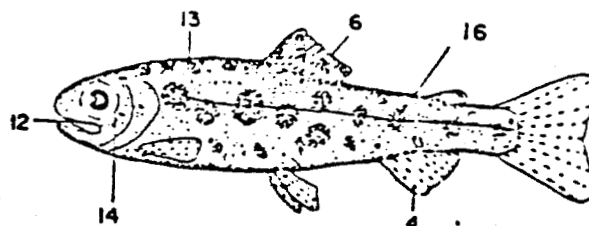
13. (9) Five to 10 parr marks along mid-dorsal ridge ahead of dorsal fin.

14. (10) Maxillary short, not reaching past posterior margin of eye.

15. (11) No hyoid mark under lower jaw. Few or no spots on tail.

16. (20) Parr marks almost round.

Rainbow or
steelhead trout
(*Salmo gairdneri*)



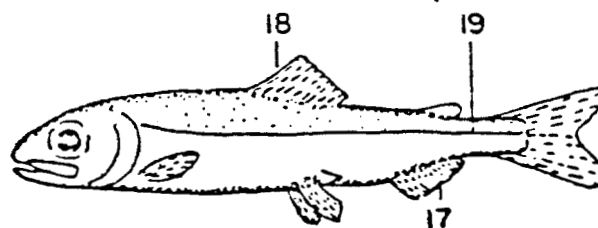
17. (4) Anal fin longer than high, with 13 or more developed rays. (Fig. 2B)

18. (6) Dorsal fin without large dark spots, may be black tipped.

Pacific salmon
Genus *Oncorhynchus*

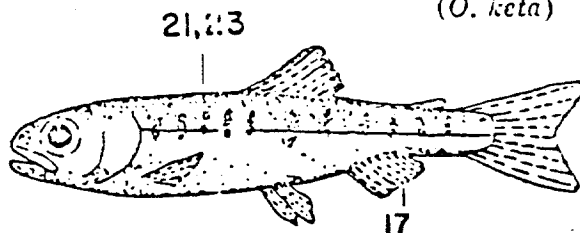
19. (20) No parr marks. Fry leave fresh water while small—approximately 1.75 inches (45 mm) long.

Pink salmon
(*O. gorbuscha*)



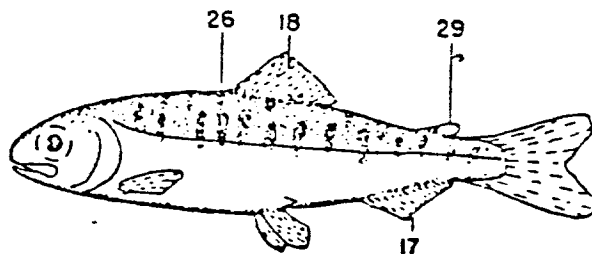
- 20. (16) Parr marks present as vertical bars or oval spots.
- 21. (30) Parr marks short, extending little, if any, below lateral line.
- 22. (25) Gill rakers on first arch. 19 to 26.
** Pyloric caeca. 140 to 186.
- 23. (26) Parr marks faint. Sides below lateral line iridescent green.
- 24. (27) Small when migrating from fresh water, approximately 1.5 inches (40 mm) long.

Chum salmon
(*O. keta*)



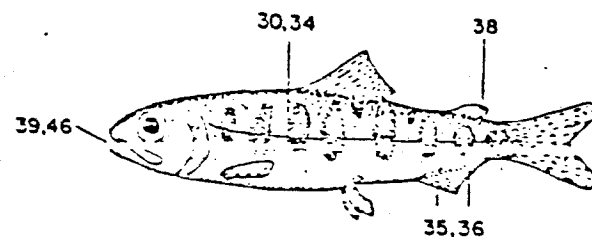
- 25. (22) Gill rakers on first arch. 30 to 40.
**Pyloric caeca 60 to 115.
- 26. (23) Parr marks usually sharply defined. Sides below lateral line silvery, not iridescent green.
- 27. (24) Relatively large when migrating from fresh water, approximately 3 to 5 inches (80 to 126 mm) long.
- 28. (31) Gill rakers long and slender, more than 19 on first arch.
- 29. (32) Adipose fin clear, not pigmented.

Sockeye salmon
(*O. nerka*)



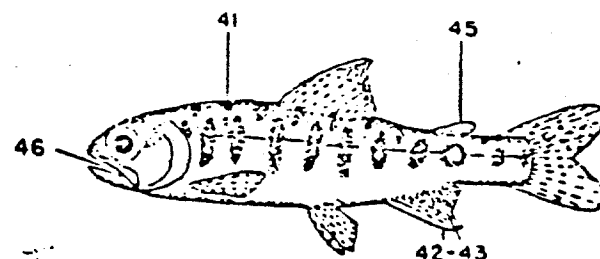
- 30. (21) Parr marks large, vertical bars centered by lateral line.
- 31. (28) **Gill rakers short and thick, fewer than 29 on first arch.
- 32. (29) Adipose fin at least partially pigmented.
- 33. (40) **Pyloric caeca more than 90.
- 34. (41) Parr marks broader than interspaces.
- 35. (42) Anterior rays of anal fin not distinctly longer than rest, not whitened.
- 36. (43) Anal fin not pigmented.
- 37. (44) Black spots, when present, on both lobes of caudal fin.
- 38. (45) Adipose fin not completely mottled; clear area at anterior base of fin.
- 39. (46) Black gums along base of lower teeth.

Chinook salmon
(*O. tshawytscha*)



- 40. (33) **Pyloric caeca less than 80.
- 41. (34) Parr marks narrower than interspaces.
- 42. (35) Anterior rays of anal fin elongated when depressed they extend to base of last ray. (Fig. 2B)
- 43. (36) Anal fin pigmented between rays, resulting in black banding.
- 44. (37) Black spots, when present, on upper lobe of caudal.
- 45. (38) Adipose fin completely pigmented.
- 46. (36) Mouth gray to white.

Coho salmon
(*O. kisutch*)



47. (1) Adipose fin not present; scales present or lacking.

Not Salmonidae

48. (2) No fleshy appendage at base of pelvic fins.

Smelts

Family Osmeridae

49. (3) Mouth small, not reaching center of eye; teeth weak or absent.

50. (51) Depressed dorsal fin, shorter than head.

Whitefishes

Genus *Coregonus*

51. (50) Depressed dorsal fin, longer than head.

Arctic grayling

(*Thymallus arcticus*)

52. (5) **Teeth on head of vomer only.

Charrs

Genus *Salvelinus*

Dolly Varden (*S. malma*)

53. (7) Adipose fin orange; row of distinct pale round spots along lateral line.

Brown trout

(*Salmo trutta*)

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GPO

APPENDIX C

General Equipment, Camp Maintenance
and Camp Policy

Equipment Maintenance

Equipment maintenance is perhaps one of the most important operations you will perform during the field season. The outboard motors and generators must be kept in good operating condition or the whole program will suffer.

It will be the crew leader's responsibility to assign the most knowledgeable member of the crew to the job of maintaining and servicing the equipment. It will be this persons responsibility to see that all equipment is kept in operating condition.

Outboard Motors:

Your outboard motor will perform longer and give less trouble if these suggestions are followed:

1. The correct outboard fuel mixture is 50:1. Always pour the oil into the tank first, then add 2 or 3 gallons of gas and mix thoroughly, then fill tank to capacity always using a large funnel and chamois filter.
2. Chain saws have a fuel mixture 25:1. Chain saw gas should be mixed in a 5 gallon can and clearly marked that it is chain saw fuel.
3. When mixing gasoline or filling the tanks of the generator, stove or lantern, keep the following in mind:
 - a. Always mix fuel tanks or equipment under cover to prevent water contamination. Always use a funnel and filter.
 - b. Fill camp stoves and lanterns outside as the danger of fire is very real.
 - c. A little extra effort toward cleanliness will pay in hours of trouble free operation.
4. Always place outboard in neutral when starting.
5. Check daily the clamp screws that hold the outboard to the transom. Also routinely check the motor for loose screws and bolts, cracks, and breaks, especially in the area of the lower unit.
6. Never start or run an outboard in the tilted position.
7. In the normal operation of a water pump, a "tell-tale" stream of water is discharged from a hole in the bottom edge of the cowling or from the back of the shaft. If this stream of water stops, the water pump is not working and the motor should be shut off. The side plate over the water intake can be removed for temporary relief as it may be plugged. If the pump continues not to function, the outboard should not be run, and a report to base camp should be made.

8. Check the grease in the lower unit of prop outboards once a week, and drain and replace grease every three weeks. Jet units must be greased daily. This is crucial. Special grease guns will be provided.
9. If the skeg or jet unit hits bottom, check the screws for tightness and housing damage.
10. If your outboard will not start, check the following:
 - a. Check to see if the fuel line is connected to the motor and the tank and not pinched or kinked.
 - b. Check to see if there is water in the gasoline.
 - c. Check to see that the engine is not flooded.
 - d. Check the spark plugs as they may be fouled or defective (replace if needed).
11. All outboards are to be tilted in the up position when moored at mainstem stations to preclude silt accumulation in the jet unit or water pump and skeg or housing damage.

Lastly, it should be emphasized that the salmon enumeration counts and sampling must continue, as they are very important to the program. All stations will be provided with a spare outboard and Sand Point will replace all inoperative outboards as soon as possible.

Boats:

1. Boats are to be kept clean and free of loose tools and debris, and moored at locations where they are not subject to damage by wave action or through contact with the river bottom in rock laden areas.
2. Each crew leader will be responsible for maintaining mooring stakes on the river bank sufficient for the boats assigned to his subproject plus one transient craft. Further responsibility includes maintaining a skookum bow line on each assigned craft and ensuring that each boat is properly moored at the end of each work day to preclude possible loss or damage.

Generators :

Portable generators may be supplied to field camps. Their maintenance follows the same line as for the outboards. Since some of the generators have 4-cycle engines, mixed gas must not be used. The crankcase oil reservoir should be checked daily and maintained at the full level. After 25 hours of operation the oil should be changed. Spark plugs should be checked after every five (5) hours of operation.

Radio Schedules

The majority of your communication with the Sand Point and Cold Bay offices will be over the SSB field radio at your camp. Radio schedules are normally at 8:45 a.m. and 7:45 p.m. daily on 3.230 megahertz unless otherwise specified by the area office. The morning schedules are normally used for passing along the current weather and the previous days escapement counts. The evening schedules are used to update escapement counts, pass along grocery or supply orders and to pass along the latest fishery announcements. KEEP SCHEDULES SHORT AND TO THE POINT. Personal traffic between camps should be at times when there are no other ADF&G schedules.

If for some reason you are the only person at a camp, a plane will be dispatched if radio schedule is missed. If you think you may miss a schedule be sure to pass this on to your supervisor at the previous schedule.

Basic procedures regarding violations

This is not intended as an inclusive procedure for handling all violations occurring within the Department of fish and Game's responsibility, but as a guideline to be used for procuring the appropriate information and/or evidence to show and prove that a violation has been committed. The importance of knowing and being familiar with the commercial fishing, subsistence fishing, sport fishing and game regulations cannot be over emphasized. If a violation is noted all pertinent information pertaining to the violation should be recorded immediately and retained by the employee. Violation procedures are printed on the back cover of the commercial fishing regulation book. A copy of regulation books for each fishery should be available in each camp. Request the regulations from your supervisor if necessary.

The use of the 5 W's can simplify and aid the officer in obtaining sufficient information pertaining to a violation.

1. What is the violation?
2. When did the violation occur (date, time, tide condition)?
3. Where did the violation occur?
4. Who is in violation and who are witnesses?
5. Why was the violation committed?

It is important that all witnesses to a violation be interviewed and all statements pertaining to the violation be recorded along with their names and addresses. If you have a camera, record as much as possible on film. Always carry your camera if you suspect you may encounter a violation. Do not attempt to arrest anyone for violation of Fish and Game regulations. Simply collect as much information and evidence as possible and contact your supervisor or a State Trooper from Fish and Game Wildlife Protection Division ASAP.

Employees without enforcement authority are somewhat restricted as to how far they can go in gaining information and evidence surrounding a known violation. If a person found in a violation refuses to co-operate with an employee without enforcement authority, no action should be taken, except

that all information and evidence collected should be relayed to an officer (Fish and Wildlife Protection Division) as soon as possible. Employees with enforcement authority will contact the individual(s) involved and at that time issue a citation if appropriate.

Emergencies

In an emergency, you should first administer whatever first aid you are trained to do in order to stabilize the injury; treatment for shock or hyperthermia if necessary. Try to contact anyone on 3.230 on your field radio to state the nature of the emergency and what type of assistance you will require. If you are unable to contact anyone on 3.230 try 2.450 or 4.125 then try any other frequency you may have. If your camp has a CB or handheld VHF radio you may be able to contact nearby fishermen. Channel six or sixteen on the VHF radio are monitored by most fishing vessels. If immediate assistance is required you may contact the U.S. Coast Guard direct (4.125 or 2.182 on your field radio) if you are unable to get hold of anyone from the local ADF&G office.

Firearms

A State rifle will be provided at each camp. You may bring your own firearm if you wish. Loaded guns are prohibited inside the camp facilities. Loaded, meaning a round in the chamber of the gun. Unload all guns completely when you are in a plane or boat. Anyone handling a firearm should always treat it as if it were loaded. Guns should be kept clean and oiled and be completely unloaded while being cleaned. Any horseplay with or misuse of firearms while working for the Department of Fish and Game will not be tolerated and will be grounds for immediate dismissal.

Bears

Do not antagonize them - each one is a potential danger. Do not encourage bears to come around camp by leaving food or unburned garbage around.

Do not shoot at a bear unless, in your best judgement, he is endangering someone's life.

When, and if, trying to frighten a bear away by shooting - do not fire toward it. By chance, you may wound it by pulling the shot, ricochets, etc.

If you are having problems with a particular bear around camp, call the office and notify them of the situation. The Game Division personnel will take care of the problem, if it is feasible.

Garbage

Burn all garbage to prevent bear problems. Never start fires with fuel. Be sure all burn barrels have proper grates or covers to prevent grass fires from sparks.

Boating

We do not expect you to endanger life or property by going out in a boat on dangerously rough water. Wear your life jackets when out on open water. Use your head - if you think it is dangerously rough, don't go out on the water!!

Extra shear pins or propellers and a tool kit which includes pliers, spark plugs, and a spark plug wrench should be in the boat at all times. In case travel at night becomes necessary, carry a flashlight.

Fire and First Aid Safety

Check your camp's fire extinguisher. Know where it is and how to use it! Inventory your camp first aid kit, replace items as needed and become familiar with basic first aid treatment. Review the first aid booklet.

Personal Gear and Pets

Generally 100 lbs. is a maximum for personal gear. If you anticipate bringing more than that amount to your field camp, check with your supervisor first. Pets, (especially dogs) should not be brought to our field camps. Past experience indicates, that one or more of the following problems usually occur:

- a. Problem of transportation in small planes for some pets.
- b. Who is going to pay for the pet food and who is going to purchase it in town?
- c. Some pets attract bears, etc. Dogs will chase a bear until the bear gets mad and then when the bear goes for the dog, the dog will run to his owner or the cabin.
- d. Your pet may not be compatible with the other members of your camp and may interfere with work.
- e. A pet that gets sick or injured can cause you considerable expense if it must be brought back to town.

Compatibility of Field Personnel

If you find yourself unable to get along with other members at your camp, notify the ARB and we will attempt to solve the problem. Usually, the person with the most experience in camp will be the crew leader. If it is not clear who has been designated crew leader in your camp ask your supervisor.

Cleanliness Of Cabin. Etc.

Keep the cabin, surrounding area, and yourself clean and neat. Appearance is important. You will not always be notified of the intended arrival of visitors, officials, etc. Impressions of visitors are often based on appearance.

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